THE IRON TRADE REVIEW

A JOURNAL OF THE IRON, STEEL, MANUFACTURING AND TRANSPORTATION INTERESTS OF THE CENTRAL WEST.

VOLUME XXI. CLEVELAND, O., SEPTEMBER 13, 1888. NUMBER 38.

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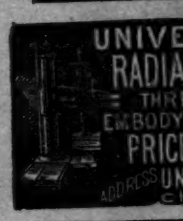

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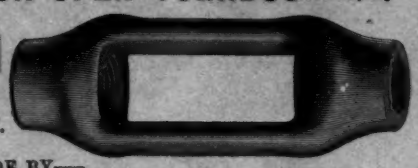

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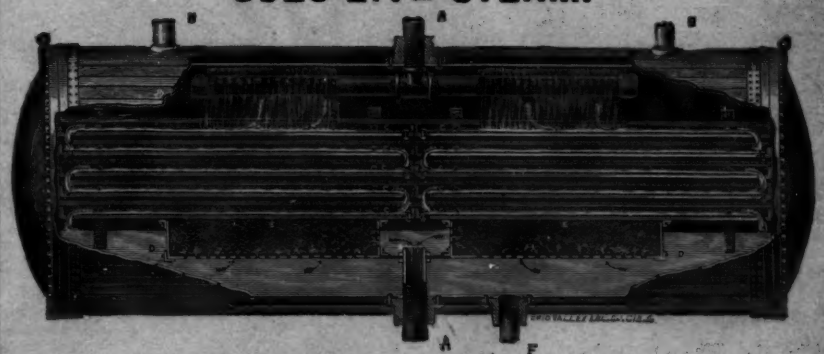

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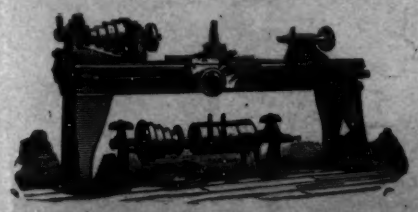

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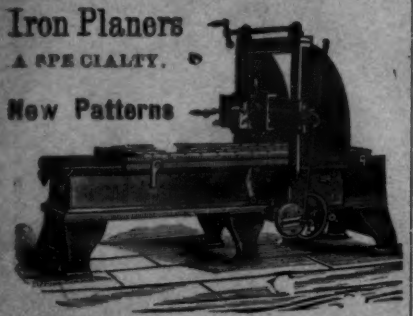

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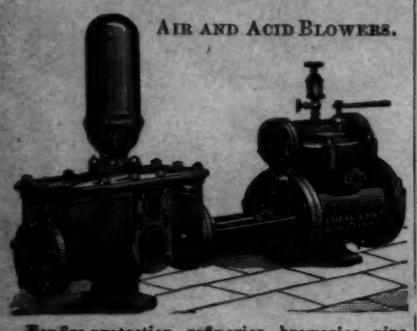

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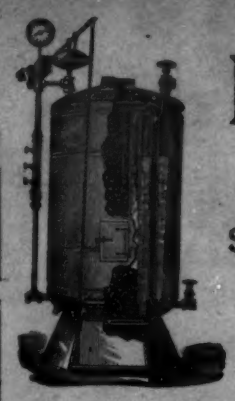

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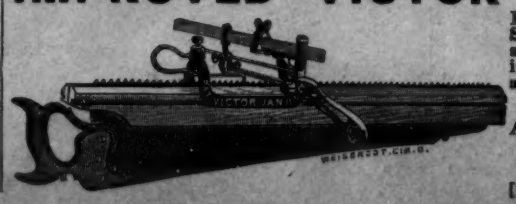

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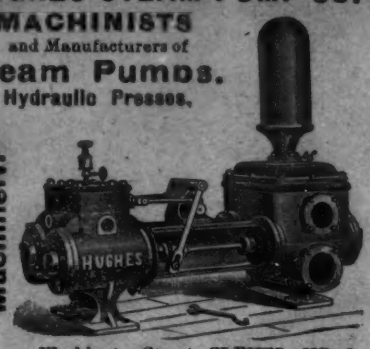

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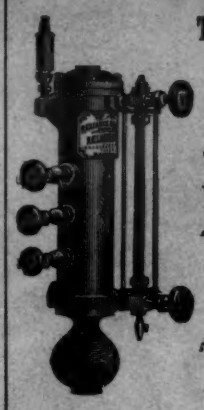

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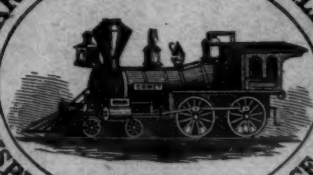

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VOLUME XXI. CLEVELAND, O., SEPTEMBER 13, 1888. NUMBER 38.

THE IMPROVED WESTERN WASHER.

We give this week an illustration of the improved Western washer, manufactured by that responsible and reliable firm, the Horton Manufacturing Co., Ft. Wayne, Ind. So popular has this most useful machine become, that it found a place in more than one hundred thousand families, who use it weekly, and thereby save much of the hard labor formerly associated with that dread occasion, the "washing day." The Western washer is kept in stock by hardware dealers in almost every city and village, and is offered strictly on its merits for practical work. The manufacturers mean what they say when they advertise that they will refund the money for goods to any purchaser who is not pleased with them, but in making the announcement they have not much to fear, for the washer gives, we understand, universal satisfaction. Superior facilities for manufacture have been put in by the firm, so that they are now enabled to turn out an average of one hundred machines daily. As an additional fact showing how popular the Western washer has become, it may be mentioned that last year a little over twenty thousand machines were sold. To many a work-worn woman a good "washer" is a boon that now would not be dispensed with on any account, and those who are still scrubbing on in the old backache way, should materially improve their domestic arrangements by the introduction of a Western washer. See the announcement of the firm in this issue.

Bower-Barffed Hollow-Ware.

Mr. Geo. W. Maynard, president of the Bower-Barff Rustless Iron Company, 35 Broadway, New York, sends us a copy of a letter recently written to Mr. Geo. Bower, of England, one of the partners of the Bower-Barff process, from the works of the French Inoxidation Company, of Cousance. As of interest to manufacturers of hollow-ware in this country, we quote from the letter as follows:

In consequence of the old specialty of the manufacture of cast-iron pots which was attached to our works, and which dates back for more than 300 years, we have devoted ourselves to the production of rustless pottery, and we must say that we have succeeded perfectly. With only one furnace we have been able to treat this year 1,000,000 pots, etc., and it has been very difficult for us to satisfy the demands, restricted, however, to the commercial centers—Paris, Lyons, Normandy and part of Brittany. If we had been able to extend our operations to the countries of the Center, West, Southwest and North, it would have been necessary to more than double our production, and this we have not been able to do up to the present, not so much in consequence of the insufficiency of the furnace (we work it at night), to which, moreover, we are about to add another, as to the want of the pots, which we have not been able to make fast enough. We are about to stop this inconvenience by having made in other foundries some of the pot patterns that belong to us, and we hope soon to be in a position to treat 2,000,000 of cast-iron pots. The second furnace that we are constructing will enable us to treat other cast-iron articles for which we are asked, and for some articles in wrought iron about which neighboring forges have spoken to us. In fine, we are very well satisfied with our working, and we reckon soon to see even better results.—[Metal Worker.

Submarine Tunnel Between Denmark and Sweden.

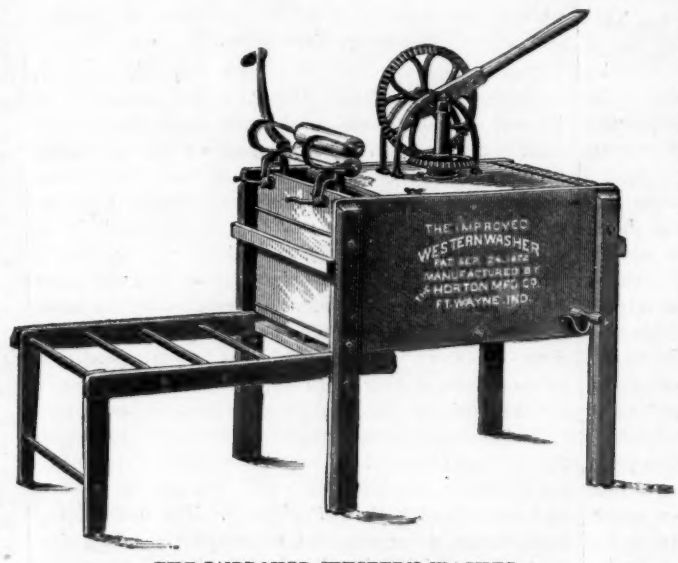
The report of the Royal Swedish Commissioners, who have been examiming M. Delancle's application for a concession to the Swedish Government, winds up with the conclusion that a submarine railway between Sealand and Sconia would no doubt insure several advantages to the international traffic, but that, as the building of it would require a very considerable capital, and the paying of the interest on the cost for a long series of years would necessitate heavy subventions from both the Danish and Swedish governments, in addition to the profits of the traffic, which would be inadequate for this purpose, the proposal for this new way of communication be abandoned for the present; that should ever, under altered circumstances, the want or the desirability of a submarine railway come into prominence it ought to be built on account of the State.

Plea for the American Ship.

From the launching of the iron propellers on the Clyde dates the decline of the American ocean marine. The first cost of iron vessels in 1845 was $100 per ton in Great Britain, and in 1887 it had been reduced to $50 per ton, and some were built for $40. The same disparity exists in favor of England in the cost of iron ships that insures to the Uuited States in wooden ships. The shipbuilders of the United States have grappled with this problem with a skill and perseverance that deserves better consideration than has been awarded it. They have reduced the cost of first-class iron ships from a cost of $100 per ton in 1850 to $65 in 1884.

The American shipping interests find themselves confronted by a majority of the House of Representatives that propose to destroy American shipbuilding by passing the Dunn Free Ship bill by which English owned ships can, by the white washing process, be placed under the American flag and without the actual purchase of a single vessel but merely by the transfer process will completely neutralize and destroy the building of iron ships by American Mechanics. Our coasting trade and coast lines of steamship transportation, that since the formation of the Government, have been protected from foreign invasion will also be open to the competition of British built and British manned vessels under the same process, and the fisheries share the same fate.

Great Britain has 17,000,000 tons of shipping of all kinds. The United States has 4,000,000 tons, of which 3,000,000 is domestic or coasting tonnage. Great Britain must of necessity develop her power and wealth by means of the ocean. She will subsidize to the last dollar to keep every ton of her shiping afloat, nor will she scruple at any means to take possession of the trade of any country.—[F. J. Babson in the Marine Journal.



THE IMPROVED WESTERN WASHER.

OMAHA expects to be supplied with oil from the Wyoming fields before two years, just as the stuff is now being piped from Lima, O., to Chicago, nearly 300 miles.

CAST IRON IN BRIDGE BUILDING.

This question, which has, says *Stahl and Eisen*, occupied the attention of engineers and iron-smelters for many years, still remains undecided. The uninitiated might conclude from this circumstance that the parties concerned had desisted from taking any further interest in the matter. This, however is far from the case. In fact, bridge builders and engineers are by experiment and application getting every day nearer the object in view, whilst the iron-smelter does his best to meet their demands. Numerous and costly experiments are uninteruptedly proceeding to solve the difficulty. The complexity lies in the fact that it depends solely on practical experience, which renders it the more abstruse, because conclusions have to be formed from the information tendered by a number of works. As regards the engineer, his task is pretty easily fulfilled, *i. e.*, to fix the quality and nature of the material to be used. For the iron smelter, however, to meet the views of the engineer is a very different task. To give an idea of the position both parties hold towards one another, it will be best to see what each is capable of doing. We will quote the opinion of one of the most famous engineers, whose views might be taken to represent those of the majority of his *confreres*. According to this gentleman, a material is required which is as close grained as possible, and possesses the elasticity and homogeneity necessary to withstand the test of stretching and contracting. To attain this end, he proposes to get a material the standard of which is 15kg. a. d. gmm., and therefore higher than that of wrought-iron, and thus obtain a saving in weight of the construction. This would especially be the case where the bridge was of great length, and where its own weight would play a greater part than the moveable weight crossing it. With regard to the technical side of the question as it now stands, the iron-smelter is in a position to produce a material possessing such qualities, but this is only by means of a process which requires great care. The cost of this, however, is much greater than for ordinary wrought iron, and therefore it is out of the question. When it relates to a cast iron, which when made in large quantities is as cheap, if not cheaper than wrought iron, it cannot be denied that although the skill of the modern iron-smelter can produce the necessary close-grained quality it is not so reliable. To satisfy all reasonable claims made upon it, and be free from those treacherous properties which have condemned cast steel, the iron-smelter should not choose a material with a higher resisting power than 43 kg. In general, it may be said that the lower he goes under this standard, the more doubtful is the reliability of the material. The constructor must, however, not be too exacting in his demands. A standard of 15 kg., a. d. gmm., with a resisting power of 45 kg., is much to high, taking into consideration that a higher pressure than 23 to 24 kg. cannot be exceeded. The limit of the standard might be fixed at 12 kg. The more this is exceeded, the less saving is there in the weight of the material.

Things That will Never be Settled.

The Engineer.

Whether a long screw-driver is better than a short one of the same family.

Whether water wheels run faster at night than they do in the daytime.

The best way to harden steel.

Which side of the belt should run next the pulley.

The proper speed of line shafts.

The right way to lace belts.

Whether compression is economical or the reverse.

The principle of the steam injector.

COST OF MAKING IRON SOUTH AND NORTH.

It is interesting to find the figures recently given by a correspondent of the Cleveland IRON TRADE REVIEW on the cost of making pig iron, stating it at $9.20 per ton at Birmingham, Ala., $13.13 in the Mahoning Valley, and $13.45 at Chicago. It is evident that the figures apply to the making of low grade irons. Perhaps the reason why no statement as to the cost of making Bessemer pig are given is that no such iron is made in Alabama; but, in view of the increasing importance of that class of pig iron, the effort to sum up "the present and future of the pig iron business" on these data is slightly rash. It is also a little singular that these figures comprise nothing on the cost of making pig iron in Pittsburgh. It is a salient commentary on the views which assume to settle the future course of pig iron manufacture, that they entirely omit from their calculations the locality which last year made 897,849 tons of pig iron against 364,236 tons in the Mahoning Valley; 292,762 tons in the entire State of Alabama, and 565,453 tons in the whole State of Illinois. It is also a little peculiar that, after experts on the cost of manufacture of pig iron have for years predicted the departure of Pittsburgh's supremacy, on the strength of these low figures of the cost of manufacture elsewhere, that Allegheny county continues to make nearly twice as much pig iron as any other iron district in the Union, and almost three times as much as either of the sections named. The experts seem to have left something out of their calculations.—[Pittsburgh Dispatch.

The apparent irritation of the *Dispatch* is quite unnecessary. It will not pretend that pig iron can be produced in the Pittsburgh district cheaper than in the Mahoning or Shenango Valley, that is to say, $12.45 for cinder mixed and $13.13 for all ore metal.

As to the "increasing importance" of Bessemer pig iron, the increasing importance of good common foundry iron is not less, if the increasing use of the two kinds are observed. Of the 6,365,000 tons of metal produced in this country in 1886, not quite 2,000,000 tons was of the Bessemer brand, and while the increase of the common grades was nearly 400,000 tons in 1887, the Bessemer product increased only about 200,000 tons. This year the Bessemer product will be little more than a fourth of the total. The points in the discussion of the Southern pig iron industry that are of real commercial value, are tersely summed up by the writer in the IRON TRADE REVIEW, to whose article the *Dispatch* objects, as follows:

That the Southern iron makers hold a certain territory absolutely, subject only to competition among themselves, either by reason of overproduction or the ability of certain makers to produce iron cheaper than others, and that their true policy is to develop to the largest possible extent the use of their raw material within this area; that another section is neutral ground, in which they must meet Western iron in a competition going more and more against them, as their freight rates increase or the prime cost of Western materials decline, that the West must recognize that a new and most powerful competitor has come to stay, and that in the future, as far as non-Bessemer irons are concerned, excessive royalties on ores must be reduced; the low rates for transportation from the mines to the furnaces must be permanently maintained, and that all available economies in mining and manufacturing must be practiced.

The South is not much interested whether Pittsburgh makes 800,000 or only 8 tons of iron. Nearly all made in that district is converted into steel, and it will not be ten years until Pittsburgh manufacturers will find their profit in drawing their ordinary foundry and mill irons from Chattanooga and Birmingham. They now get a liberal share of that line of supplies from West Virginia and old Virginia, and buy some in Alabama and Tennessee.

Here are some figures to which we invite the attention of the *Dispatch*. In Georgia the production of pig in the first six months of 1888 amounted to 20,859 tons, as compared with 21,441 tons in the corresponding period of 1887. The output in Alabama in the first half of 1888 was 160,207 tons, as compared with 133,712 tons in the first half of 1887. Tennessee made 114,065 tons in the first half of 1888, as compared with 106,862 tons in the first half of 1887. The aggregate output in these three States in the first half of 1888 was accordingly 295,131 tons, as compared with 255,015 tons in the corresponding period of 1887, showing an increase of 39,116 tons this year.

This statement is taken from a standard authority, and we suppose it will not be questioned. If our Pittsburgh contemporary will bear in mind the fact that this increase of nearly 40,000 tons in the three iron-making States of the Central South has occurred in a period of peculiar dullness in the trade in the country at large, and at a time when prices are almost as low as the lowest ever reached, the significance of the phenomenon will not fail to impress him. Further, while the Central Southern field increased its output in the first half of the year 39,116 tons, the total output of the country fell off 126,676 tons. Therefore the loss in the North, as compared with its product in the first half of 1887, was 165,792 tons. In the presence of these statistics, gathered by actual furnace returns, the talk about "relative greater importance of Bessemer iron" as compared with the common grades, is of small account. The point of special importance is that the three States of Georgia, Tennessee and Alabama will make 100,000 tons larger output of metal this year, with prices at the very bottom rate, than they made when prices were quite satisfactory.

When we remember that the country last year consumed more than 4,000,000 tons of the grades of coke and charcoal iron made in the South, and that the demand for those grades has steadily and rapidly increased in the last eight years, we must be allowed to congratulate ourselves on the fact that good iron can be made in these Southern States at a cost of $3 to $4 a ton cheaper than it can be made in the most favored Northern districts.

The present season of depressed prices applies the rule of the "survival of the fittest" inexorably, and no observant iron master can fail to perceive where the "fittest" are located.

The Southern masters have never pretended they can compete with Pittsburgh in the production of Bessemer iron, though the time is not far distant when this section will make its own Bessemer and open hearth steel of its own ores, thus eliminating a large slice of that market from the Pittsburgh furnaces and mills. A field that has been developed from zero to a capacity of a round million tons of iron a year in two decades has in it the resources and energy to take care of itself and become a formidable competitor for trade that has for a century been regarded as the peculiar preserve of Pennsylvania.—[Chattanooga Tradesman.

[The comments of the Pittsburgh *Dispatch*, as above, are entirely out of place. If it had read an article on the cost of iron North and South more carefully, it could not have failed to notice that we were discussing the possibilty of Southern non-Bessemer irons taking possession of the Western and Northwestern markets. In these markets as far as raw iron is concerned, Pittsburgh plays no part. It goes without saying, that if Pittsburgh can make pig iron as cheaply as Lake ports, the freight on the same to markets reached by the latter points, would fatally handicap her, when margins were close. We know of no expert who has for years predicted the departure of Pittsburgh supremacy, except one of her own business men, who ought to be called an expert so far as figures are concerned. If we are not mistaken, Mr. Andrew Carnegie is responsible for the statement, that Chicago could make and put into general market, steel rails, cheaper than Pittsburgh. The unnecessary sensitiveness of our esteemed contemporary might give rise to the suspicion that Pittsburgh, after all was somewhat apprehensive of what was being accomplished elsewhere.—ED. IRON TRADE REVIEW.]

Burnishing Iron and Steel by Electricity.

The following method for burnishing iron and steel by means of the electric current was communicated by A. de Meritens at a meeting of the International Electric Society in Paris. The layer of oxide on the surface of the metal is obtained by placing the same as anode in a bath of common or distilled water. The sides of the vessel holding the liquid, or a piece of iron, copper or carbon, are used as cathode. The temperature of the water is kept at 160° to 175° F. The electromotive force must be just strong enough to decompose the water, as a current which is too strong gives a dusty layer which is not permanent. Under the action of the oxygen liberating at the anode, a layer of a black oxide (Fe_3O_4) forms on the metal. This layer can be easily polished, steel giving the best results, while on cast and rod iron a more dusty layer is obtained, though the use of distilled water makes the polish permanent.

ON the Volga river in Russia, the longest stream in Europe, there are 7,000 vessels at work, and 200,000 men work on it handling 5,000,000 tons of merchandise per year.

COMPULSORY INSURANCE OF WORKINGMEN.

Iron Age.

The law of compulsory insurance of workmen against injuries in Germany has now been in force for over two years, and ironmasters in that country are getting into a position of being better able to count the cost. The results of such an investigation are not calculated to make them very contented with the law or to lead them to look with equanimity at the efforts to force them to acquiesce in the proposed act providing pensions for workmen. A recent issue of *Stahl und Eisen* contains some very instructive figures. When the insurance act was passed the Government presented estimates to show how the payments for compensation to men injured at work might be expected to grow, taking the sums paid in the first year as the unit. Tabulated, the progressive increase is as follows:

1st year	1.00	17th year	19.67
2d "	2.48	20th "	21.88
3d "	4.00	45th "	32.07
10th "	13.10	76th "	33.22

The increase from year to year is, of course, due to the growing number of men receiving compensation for injuries rendering them invalids. Now, for the first 15 months, from October 1, 1885, to December 31, 1886, the money paid to injured workmen was 67,118.98 marks in the association of iron and steel works of Rhenish Prussia and Westphalia, the largest branch in the country. The number of men insured was 70,313, on an average their total wages for the 15 months being 83,841,224.71 marks. In 1887 the sum paid was 226,347.09 marks on 72,101,410.79 marks wages paid to 74,179 men. These figures are exclusive of the cost of administration, 43,753.20 and 35,014.65 marks respectively, and exclusive of payments to reserve fund, which was 201,356.94 marks for 1885—86 and 452,694.18 marks for 1887. Per capita the damages, exclusive of cost of administration and reserve fund payments, were 0.95 marks in 1885—86 and 3.05 marks in 1887, while per 1,000 marks of wages the payments for compensation to workmen injured footed up to 0.80 marks in 1885—86, rising to 3.14 marks in 1887. It is this rate of increase which is staggering to German ironmasters contrasted with the official estimates. The sum is nearly four times greater during 1887 than during 1886, instead of being less than two and a half times greater. If the present rate goes on, German ironmasters will soon have to pay 2 per cent. of the wages earned, for damages, for injury sustained, exclusive of the cost of administration.

Blasting of Steel Castings.

A most successful series of experiments has been carried out in the new foundry of the Messrs. Goodwins at Ardrossan. The castings had become useless, and, as some of these weighed 3½ tons, it was necessary to have them broken up before they could be put into the crucible again to be recast. To effect this the Messrs. Goodwin engaged a few of the dock employes to experiment on the heavy masses with dynamite, but with the large 3½-ton pieces they were unsuccessful on five different occasions. The services of Mr. Daniel Blyth, for fourteen years in the employment of Messrs. Noble, of Ardeer, were called in on Monday, and his wide experience enabled him to bridge the difficulty. He charged the largest casting, weighing 3½ tons, with blasting gelatine, which was exploded, and the casting was shivered to atoms. No damage was done.—[Colliery Guardian, London.

Abandoning Natural Gas.

Ohio Valley News, Martin's Ferry, O.

One by one the manufacturers in the Ohio valley are abandoning the use of natural gas and returning to coal, from its irregular supply and the extortionate price demanded. The gas companies may find before long that it takes two parties to make a bargain. While the people have been to great expense putting gas in their factories and dwellings, and would regret to forego the use of gas, they will not stand imposition or extortion. They were assured that gas would be furnished at or below the cost of coal, but the prices charged last year were fully 20 per cent. in advance of coal, and now it is proposed to advance the rate to private consumers 33 per cent. We mistake the temper of our people if they stand it.

THE Western Machine Works of Ottumwa, Ia., have recently added a boiler shop to their plant, and are now at work on their fifth new boiler. They are preparing to manufacture a twist coal mining drill, for which they already have numerous orders on hand.

REVIVED USE OF IRON.

Colliery Guardian, London.

The return of the accountant to the Northern Board of Arbitration and Conciliation, for the manufactured iron trades lately issued, shows how unwise were the prophesies of those who three or four years ago deemed iron to be a dying industry. In that large center of the trade, the Northeastern district, these returns prove that there has been, not only an increased demand, but that the increase is large, and that the price on the average is higher than it was a year ago. It becomes interesting, then, to trace the cause of the revival—interesting not only to the trade itself and to those who produce finished iron, but also to the producers of crude iron, for manufactured iron calls into use a larger quantity of the cheap crude material of Cleveland than does steel, which some expected would ere this have wholly taken its place. Hence, it is evident that the interests of the iron-producing districts are involved more generally than has been supposed. Of late these latter have been affected by the increased importation of rich hematite ores, and now there is coincidently a decrease in that importation, and an increased use of our own local ores—a fact which cannot be regretted from a national point of view at least.

It may be said at once that the improvement in the demand is mainly due to the enlarged requirements for ship-building uses. In the face of the statements as to the "universal use of steel" for ship-building this seems singular, but there are two facts which have to be borne in mind. The first is, that whilst there is a large use of steel for great liners, yet that use is by no means so universal in regard to the cargo-carrying steamer, many vessels of that type being still built of iron. And again, even in steel vessels considerable quantities of iron plates are required. Some ship-owners will have iron plates in certain positions, the belief being held by not a few that the corrosion of steel plates in certain positions is so great that iron plates in those positions are preferable. From both these causes there is a decided increase in the use of iron, though it is concurrent with an increase also in the use of steel plates. The ship-building trade has had a considerable revival, and both the producers of iron and steel have shared in the improvement. It is not neccessary to define the extent of the relative increase in the demand—it is sufficient to notice that though there is now an enlarged production of steel plates, and that to a very great extent, there is also a demand for iron which has set going some of the mills which have been long idle, and which are employed in producing plates selling at prices slightly above what they were a year ago. And from the orders which have been given out for ships, both of iron and of steel, it may be fairly concluded that the activity now known at the rolling mills will coutinue for a good many months to come. The orders which have been booked, however, are orders at prices something like those that are now current, and thus it is not to be expected that there will be any very great profit realized by the manufacturers, but their long unproductive plant will be employed, and they have now the advantage of very cheap iron, as low as it has been known to be for years. These are important facts to set against that of the comparatively low prices at which manufactured iron is selling. The tendency both of the price of Cleveland iron and that of the selling price of manufactured iron is upward, so that much will depend upon the relative rapidity of the movement in the two articles for the determination of the profit which may be obtained on future orders by the manufacturer.

It is now well known that the effect of the increased demand for crude iron in Cleveland has been to lessen the stocks of that iron in the stores there and in the hands of the makers, by one-sixth of the quantity held at the beginning of the year. The decrease in the stocks is continuing, and this in the face of a remarkable abstention from buying on any scale of magnititude by the United States. That abstention cannot long continue—the tariff uncertainty must soon come to an end, and which ever way it terminates it is to be expected that America will buy more freely than she has done of late. Crude iron is so cheap now that it is profitable to buy it, and when there are lower freights to the United States we may in all probability see more of our cheap crude iron sent there. It is scarcely probable that we shall see any large increase in the shipments to that country of manufactured iron, but it does seem to be probable that such will be the result of the settlement of the tariff question in regard to crude iron. In the meantime, ship-builders are busier, and railway companies are carrying more goods, so that these two great sources of consumption of manufactured iron, ship-building and railway plant will of necessity use more, and with them there will be an increased use of finished iron in many of the contributory industries.

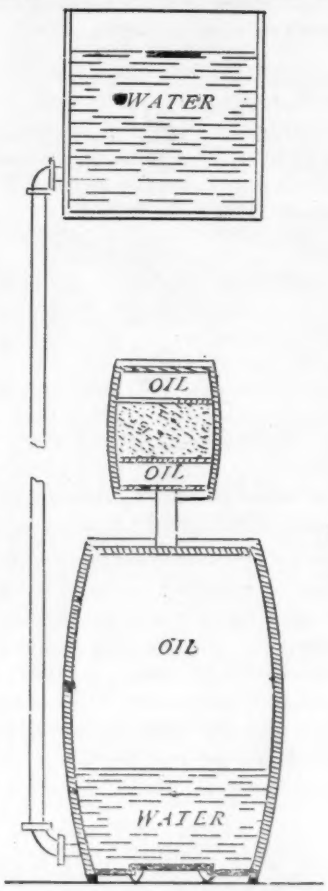
Thus it may be expected that although the advance of steel may be anticpated, yet there will be for some time to come at least, employment for many of the finished iron-makers. There is considerable doubt as to the prospect of prices, for if steel is further substituted to any considerable degree in the early future, there will be an increase of the competition between the respective branches of metallurgy, and especially on the part of the manufacturers of malleable iron, and prices will be to a large extent endangered. Still the fact remains that the manufactured iron trade has at the present time a far more promising future, in regard to quantity of production, than could have been foreseen a year or two ago.

A SIMPLE OIL FILTER.

American Journal of Railway Appliances.

A cheap and very serviceable oil filter may be made as follows:

Take a barrel or keg, with both heads in, of sufficient size, to hold the oil you wish to cleanse. Run a pipe



in at the bottom and lead it off to an overhead tank that is filled with water, and from which water can be brought down to the barrel. From the top head of the barrel, lead a pipe up to and into the bottom of a smaller cask or tank placed on the barrel. In this tank put two perforated partitions, six or eight inches apart, and fill the space between them with charcoal. In the top of the small tank put the faucet for drawing off the oil. In the bottom head of the barrel, have a hand hole for cleaning.

The pressure of the water from the upper tank forces the oil up and through the filtering material in the small tank. In this way the oil is filtered upward and all heavy matter will fall to the bottom of the barrel, from which it can be readily removed.

Connellsville Coke Production

The Pennsylvania Bureau of Industrial Statistics reports that the 12,561 ovens in the Connellsville region produced 4,296,343 tons of coke during the year 1887. To produce this 6,489,699 tons of coal were mined, about 65,000 tons of which were marketed as raw coal. To mine and coke the output of the region, as stated above, 11,396 men were employed. The 73 works in the region ran from 180 to 309 days, averaging 231 days. The low average of working days was caused by the strike of last summer, in which a greater part of the region was idle for several months. The production of coke, for the same reason, shows a falling off from the year previous.

STEEL SHIP-BUILDING ON THE PACIFIC COAST.

Pacific Coast Wood and Iron.

The building of the steel steamers Arago and Pomona and the launching of the cruiser Charleston, have demonstrated the fact that as fine steel steamers can be built on this coast as at any place in the world. With this fact established, it is well for us to compare the advantages possessed by our ship builders over those of the East, and no better showing can be made than by comparing the new steel steamer Pomona, lately built by the Union Iron Works, and the steamer Corona, just launched, from the yard of Neafy & Levy, Philadelphia. The Corona was contracted for October 29, 1887. She was to be 230 feet long, 34½ beam, and 16 feet deep. She was launched August 4, 1888. Now we propose to allow two months from that time to finish her and prepare her for the sea. It will then take her two months to come round the Horn, two weeks to clean up and overhaul her, and two weeks to furnish her for her first trip, which will bring the time to about the 4th of January next before she will be ready for service.

The Union Iron Works contracted to build the Pomona September 14, 1887. She is 230 feet long, 33½ feet beam, and 16 feet deep. She was launched May 26, 1888. Was completed, furnished, loaded and started on her first trip July 29th, and returned to this port after a successful and perfectly satisfactory trip. August 4th, on the morning of the same day, the Corona was launched. Shipmasters inform us that a ship of this kind is worth $130 per day, and the difference in time between the day the Pomona entered service and the day next year when the Corona will be here ready for work, shows a large amount in favor of the Pomona. As to cost, the contract price for the Corona was $188,000 in Philadelphia, or $198,000 delivered here. The contract price of the Pomona was $200,000, or only two thousand dollars more, and while the Pomona is at work earning money for her owners, the Corona has yet to be completed and make a long ocean voyage.

By this comparison we show that the Pacific Coast can build just as good serviceable ships, and far more expeditiously than can the old yards of the Eastern coast.

The New Industrial Era in India.

A recent editorial in the *Indian Engineer* calls attention to the rapid growth of India as a food exporting and manufacturing country. The time was when Europe turned to India for precious stones and hand-made fabrics, giving in return her manufactures; now she is a competitor in European markets with her vast exports of fibers and grain. Indian exports have increased from 9½ millions sterling in 1834 to 88 millions in 1884, a large part of this growth occuring since the opening of the Suez Canal, which materially reduced freights to European ports; but the rapid development of the railway system has probably been the most important factor in this growth by opening up sections of country previously beyond reach, and permitting their products to be cheaply brought to the seaports. The use of local petroleum instead of wood or coal imported from England has reduced the cost of operating the railroads over 33⅓ per cent, an important item when taken in connection with the fact that it is the high freight rates which alone prevent India being a dangerous competitor with the United States for the grain trade of Europe, for as the *Engineer* observes, "the cost of production is so low that the ultimate dimensions of the Indian wheat trade are chiefly a a question of possible reduction of the cost of carriage."

The Mossbay Company.

Puget Sound Correspondence, Pacific Coast Wood and Iron.

The other important announcement was that a contract had been signed between the Seatle Lake Shore & Eastern Railway Company and the Mossbay Iron Work, Company, recently located at Kirkland, on Lake Washington, the terms of which contract specify that upon January 1st, 1890, the Mossbay will furnish the other company 10,000 tons of railroad iron from the Kirkland mills, and by April 1st, another installment of 20,000 tons is to be furnished. This sets aside all doubts about the great mills being located at Kirkland, and it also indicates that work on the new mills is to be pushed speedily to completion. This will require the employment of a large force of laborers and the expenditure of a great amount of capital during the next year.

ACCORDING to the *Electrical Engineer*, Mr. E. Blass a German scientist, has used an incandescent lamp for actual inspection of the inside of boilers under steam.

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ENTERED AT THE POST OFFICE AT CLEVELAND, O., AS SECOND CLASS MATTER.

CLEVELAND, O., SEPTEMBER 13, 1888.

PETROLEUM FOR PUDDLING.

We have received the following inquiry:

To the Editor of the IRON TRADE REVIEW:

Have you any information as to what it costs to heat iron per ton with coal in this city? If so, I would be greatly obliged if you would give me the same, or put me on any line to secure said information. I am anxious to compare the cost with that of fuel gas. It has been demonstrated pretty well that iron can be heated at Pittsburgh with gas made from oil at 30 cents per ton.
CLEVELAND, O., September 7, 1888. PETROLEUM.

The amount of coal (nut) to the ton of iron, for puddling, varies in Cleveland from 2,000 to 2,800 pounds according as double or single reverberatory furnaces are used. The average would be about 2,500 pounds. With nut coal at say $1.25 per ton, this would bring the fuel cost per ton of iron up to about $1.37½. Under some circumstances—as, for instance, with coal at $1.10 per ton—the fuel cost would come somewhat under the above figure. The figure named by our correspondent as to the fuel cost, where petroleum gas is used, is certainly very low.

THE GENERAL HARDWARE MARKET.

Business up to the present has been good, unusually so for the Presidential year, and the outlook for the balance of the season is encouraging. In shelf hardware, prices have remained very satisfactory. The changes that have taken place have been of an upward tendency, and the volume of business done above the average. Builders' hardware is in better demand than for some time, particularly in this city, where an unusual amount of building has been going on. Season goods, such as stove-boards, coal-hods, stove-pipe, elbows, etc., are moving off satisfactorily, and with the exception of the usual flurry in stove-boards, prices are well maintained.

Owing to the differences between the iron workers and the mill owners, and the consequent shutting down of a large number of mills during the greater part of July, sheet iron has become somewhat scarce, and prices have consequently advanced. The demand, notwithstanding, continues good.

In heavy hardware, the market is firm with an upward tendency, the rise in pig and manufactured iron making manufacturers very careful about booking orders ahead.

Carriage bolts have advanced on the base price from 75 and 5 to 75 and 2½, the quantity of rebates remaining as heretofore.

Copper continues rather weak, owing, undoubtedly, to the opening up of new mines that are not controlled by the syndicate. It is understood, however, they are endeavoring to get control of all the new mines opened up thus far that amount to anything. If they are successful it will naturally give a firmer tone to the market if it does not advance prices.

Pig tin is again being manipulated by the French syndicate that had control of it before, and as a consequence the London market advanced £6 last week, followed by an equal advance on this side. The movement is entirely a speculative one, and although the price will undoubtedly go still higher, the bottom is liable to fall out at any time, as the accumulation on the other side is very large, this country having imported less than one-half the number of tons to date, it did in 1887.

In tin plate the demand is fair and prices satisfactory. Coke tins have become somewhat scarce owing to the large crop of fruit all over the country and the consequent demand for this article for canning purposes. Prices for spot are higher. Futures, however, can be placed in Liverpool at from 13s. 6d. to 14s., which is about where they have ruled for the past year.

OUR WESTERN SUEZ CANAL.

The fact is not generally known, or if known is not appreciated, that more tonnage passes through the Sault Ste. Marie Ship Canal in six or seven months of navigation each year than passes through the Suez Canal during the entire twelve months. Now comes the statement that the business of our Western Suez for August was the greatest in its history. We append herewith a table showing a comparison between August of this year and the corresponding month of 1887:

STATEMENT OF TRAFFIC
through St. Mary's Falls Canal, Michigan, for August, 1887 and 1888.

Items.	1887.	1888.	Excess 1887.	Excess 1888.
Vessels, number	1,780	1,448	332	.....
Lockages, number	758	687	66	.....
Tonnage, registered	872,461	987,282	.....	114,821
Tonnage, freight	973,926	1,212,893	.....	238,967
Passengers, number	9,597	8,092	1,505	.....
Coal, net tons	234,633	353,388	.....	118,755
Flour, barrels	265,087	354,994	.....	89,907
Wheat, bushels	2,720,269	3,388,662	.....	668,393
Grain, other than wheat, bushels	75,110	188,700	.....	113,590
Iron, manufactured and pig, net tons	15,724	11,791	3,933	.....
Salt, barrels	38,421	38,099	322	.....
Copper, net tons	4 449	3,436	1,019	.....
Iron ore, net tons	489,089	543,538	.....	54,449
Lumber, Ft. B. M.	3,621,500	5,142,000	.....	1,520,500
Building stone, net tons	1,054	8,518	.....	7,464
Unclassified fr't., net tons	58,646	53,803	4,843	.....
Silver ore net tons	41	435	.....	421

One important thing demonstrated by the above is the fact that the steel carrier of large tonnage is rapidly driving the small craft from the carrying trade. Thus, while there were 332 more passages through the canal during August, 1887, the excess of freight tonnage for August, 1888, was 238,967 tons. The large increase in coal, iron ore, wheat and lumber will be noticed. Indeed, the months of June, July and August of this year are the greatest three months in the history of the canal, and each one successively shows an increase over the other.

STEEL-MAKING IN NOVA SCOTIA.

Mr. J. H. Bartlett, M. E., of Montreal, the well-known Canadian iron and steel expert, sends to the IRON TRADE REVIEW the following description of what he terms "the most successful steel works in Canada":

New Glasgow (N. S.) ranks among the most enterprising and progressive towns in the Maritime Provinces. It is situated at the head of navigation on the East River, which flows into Pictou Harbor. The famous Pictou coal mines are in the immediate vicinity, with all of which New Glasgow is connected by rail. The town is also connected with the Intercolonial Railway at Truro, by the Pictou Branch, with the Straits of Canso by Eastern Extension, and with Pictou by the Stellarton-Pictou branch. With such an advantageous position and surrounded by a fine agricultural country, it is hardly a matter of surprise that New Glasgow is outstripping its sister town, Pictou, the shire town of the county.

The principal iron works are at Trenton, about a mile below New Glasgow. Indeed the village of Trenton has grown up around the works since their establishment.

The Nova Scotia Steel Works, which were established in 1882, have invested in them a paid-up capital of $280,000, two-thirds of which stock is owned by citizens of New Glasgow. Some of the stock is also owned in Halifax, Pictou, Montreal and other places—Sir D. A. Smith being one of the Montreal shareholders. The works occupy about ten acres of land—the main building, 410 feet by 130 feet, covering over 80,000 feet. Extensions are being made to the buildings, which will cover 25,000 feet additional. Nearly two miles of railway track are in operation in and about the works, which will be largely increased by sidings now being laid down. The principal items of plant are the following:

Two open-hearth steel-melting furnaces—one 15 and the other 20 tons capacity.

Five re-heating reverbatory furnaces.

Two re-heating Siemens gas furnaces.

The machinery comprises—one 26-inch cogging mill, fully equipped with live rolls, hot billet shears, etc.

A 22-inch sheet mill.

A 17-inch nail-plate mill.

These are driven by a pair of compound condensing engines of twelve hundred horse-power.

A 16-inch bar mill.

A 9-inch merchants' bar mill.

These are driven by a high pressure engine of 800 horse-power.

Plate and cropping shears.

One steam traveling crane of 10 tons capacity.

A number of steam hammers. In all, there are 40 steam cylinders in operation in the works from the 30-inch cogging mill engines down to 6-inch cylinders.

One heavy roll turning lathe, driven by an independent engine.

In the steel spring tempering department are heating and annealing furnaces, drop hammers and all other plant necessary for the rapid production, in large quantities, of springs and teeth for agricultural implements.

In another department are the necessary shears and punches for the production, on a large scale, of railway fish plates, both bar and angle; tie plates, plow plates, etc.

In the machine shop are all the usual and necessary plant for such an establishment, such planers, lathes, drills, etc.

The product of the works consists largely of steel for agricultural implements, together with the usual sizes of merchants' steel, in rounds, flats and squares, with angles and special sections. A large quantity of spring steel is also made. Rivet steel, of specially low carbon, is also manufactured, besides tramway and pit rails; nail and plough plate, and large quantities of "sections."

The works are well supplied with water, the New Glasgow system having been extended to Trenton.

Being situated, as already stated, on the Pictou Branch Railway, and alongside the East River, the Company has excellent facilities for shipment of products, both by rail and water. The bulk of the output, however, passes over the I. C. R. for consumption in the Upper Provinces. In 1884 the shipments from the establishment were only 2,270 tons; last year, 1887, they amounted to about 6,000 tons, and when the plant now being put in is completed, the works will have a capacity of 12,000 tons, and no difficulty is anticipated in disposing of the increased production.

Gold and silver medals are held by the Company from Dominion Exhibitions.

At the present time there are 225 men on the pay list, and the monthly pay is about $8,000. The number of men will be increased to 300 when the additions to the works are completed.

The Company is paying dividends, both on its original and preferential stock. Its success is due largely to the fact that the directors are hard-headed, practical business men, while the managing director has a practical knowledge of the requirements of such an establishment, and gives close personal supervision to all departments of the work.

THERE is no journal in Canada that is doing more or better work in building up the industries of the Dominion than the *Canadian Manufacturer*, published at Toronto under the able supervision of Mr. Frederic Nicholls, Secretary of the Canadian Manufacturers' Association. It is a staunch advocate of protection to Canadian manufacturers, and its cartoons in support of that policy are very telling. Just now it is showing a commendable stroke of enterprise by publishing a series of portraits and sketches of "Captains of Canadian Industry." The *Manufacturer* of September 7th has this appreciative notice of the IRON TRADE REVIEW: "The Cleveland IRON TRADE REVIEW, of August 16, was a Centennial edition, commemorative of the great Centennial Exposition of the Ohio Valley and Central States, recently held in Cincinnati. Among the more interesting features of it are concise and condensed descriptions of a number of the more enterprising manufacturing

centres of Ohio, from which fair ideas may be obtained of the greatness of that great manufacturing state. Careful work, fine paper, and good printing and press-work are characteristics of the edition to which we allude, and there are just fifty-two equally good and interesting TRADE REVIEWS published each year."

AN OPEN LETTER TO THE PRESIDENT.

To the Editor of the IRON TRADE REVIEW:

DEAR SIR:—I send you a copy of a letter which I have written the President, for publication your in journal if meeting your approval. I am,

Faithfully Yours,

WILKINS TRICK.

CHICAGO, Sept. 12, 1888.

To His Excellency, Grover Cleveland, President, United States of America.

RESPECTED SIR:—In perusing your letter of acceptance as the Presidential nominee for a second term of office, and now given to the public, I am struck with the incongruity existing between the sentiments of approval and sympathy attributed to you towards the formulation of the Mills bill in its provisionary details, together with its passage through the House of Representatives, and the ideas conveyed by you in that portion of the letter wherein the following language occurs: "We fully appreciate the importance to the country of our domestic industrial enterprise. In the rectification of existing wrongs their maintenance and prosperity should be carefully and in a friendly spirit considered. Even such reliance upon present revenue arrangements as have been invited or encouraged should be fairly and justly regarded. Abrupt and radical changes, which might endanger such enterprises, and injuriously affect the interests of labor dependent upon their success and continuance, are not contemplated or intended."

When the Mills bill was being in debate, evidence was adduced showing the further injustice sought to be inflicted upon the suppressed American tin-plate making industry, by the total abrogation of duty upon imports of the article, and hence removing all shadow of possibility for its future revival under any circumstances.

Not only was it most conclusively demonstrated that with the advent of free tin plate would the business of sheet iron making in the United States become virtually defunct by tin plate usurpation of black sheets for the different purposes to which they are now applied, and inflicting losses not only on capital with its ruined plants, and labor from its unemployment, but also by the easy transposition of spuriously made sheets imported under the guise of tin or terne plate duty free, reconverted into black plate and evading the toll; as its cheap coating of metal is capable of ready removal without any detriment to the black sheet which it had covered for the purpose of defrauding the customs.

The plain and inconvertible presentation of these facts should have warranted an unbiased consideration of the question; but they remained unheeded; failing in any way to influence the course, premeditated and determined upon by the framer and supporters of the bill, which also receives your distinguished approbation.

The glaring inconsistency between the annihilation of one industry which had been most favorably inaugurated, and the prevention of all possibility of its resuscitation by placing tin plate on the free list, together with imminent destruction to another, the black sheet manufacture in the States now threatened by the policy of the Mills bill, passed under the ægis of your approval, and the sentences excerpted from your letter, is apparent to everybody. Past proceedings in the matter fail to conform with the protestations of intent conveyed in your present communication.

The two will not dovetail; and I with many others interested in the establishment of tin plate making in America, would desire to know the precise position you take in respect to it, as at present it is paradoxical, and most unsatisfactory, preaching and practice appearing to be diametrically opposed to each other when contrasted from the standpoints as above indicated.

I have the honor to remain, respected sir, your most obedient humble servant, WILKINS TRICK.

CHICAGO, Ill., September 12, 1888.

A Modification of the Bessemer Process.

The Carlsson modification of the Bessemer process is employed in Sweden in the treatment of a charcoal pig iron containing about 1·5 per cent. of silicon, 0·1 to 0·15 of manganese, 3·9 of graphite and 0·1 of combined carbon. The slag produced in the production of this pig iron approximates more closely to a tri-silicate than a bi-silicate, alumina being considered as a base. After the pig iron has been charged into the converter, it is blown for about five or six minutes, until the blue flame appears that marks the commencement of the combustion of the carbon. The blow is then stopped, and a definite proportion of the charge, varying with the quality of the metal it is desired to produce, is poured into a ladle of peculiar construction, so arranged as to show the weight of the metal charged into it, the slag being carefully removed. This portion of the charge usually contains 4·15 per cent. of carbon, 0·05 of silicon and 0·07 manganese. The remaining portion of the metal in the converter is then blown until most of the carbon has been eliminated and the bath converted into malleable iron. The portion of the metal previously removed, together with any necessary additions required for special purposes, is then added to the bath. When the reaction that ensues is ended, the metal is ready for pouring. Before this addition is made, the bath usually consists of metal containing a trace of silicon, 0.03 per cent. of manganese, 0·05 of carbon, and, as a maximum, 0·02 of sulphur. As this metal is usually red-short, some rich manganese iron is added before the addition of the second portion of the metal from the ladle. The percentage of silicon in the final product is usually about one-tenth of that of the carbon, so that steel containing 0·2 of carbon would also contain 0.02 of silicon.

Agricultural Machinery in Uruguay.

A correspondent of the French Chamber of Commerce in Paysandu, says in his report that the demand for improved agricultural machinery is increasing every year in Uruguay, and is at present principally supplied in Great Britain and the United States, but it could, no doubt, be greatly developed if manufacturers were to send over specimens of their machines, accompanied by intelligent mechanics, who could not only work them on the farms in the interior of the country, but note the modifications that might have to be introduced owing to the peculiar conditions of soil, climate and conformation of ground. The French made some consignments of threshing machines, harvesters and other agricultural machinery, but with little success, owing to their neglecting to make themselves previously acquainted with the conditions in which the machines would have to work, and lately the Germans are beginning to feel their way in the market. At the present time the machines mostly in request consist of threshing machines, with locomobiles of 8 to 10 horse-power, also independent locomobiles of 6 to 10 horse-power; reaping and binding machines, and American ploughs; and it is stated that there exist in the republic upwards of 400 threshing machines with locomobiles of 8 to 10 horse-power, and between 150,000 and 200,000 reaping machines. A uniform duty of 5 per cent. is imposed on all machinery imported into Uruguay.

Big Steel Plant For Fall River.

It is reported from Fall River, R. I., that a syndicate composed of three capitalists of national reputation whose names are for the present withheld, has been looking over the field for the establishment of a big steel plant in New England, and have decided to locate in Fall River if a suitable site can be obtained. Such a site, in their opinion, is the wharf and lumber yard property of Cook, Borden & Co., on Davol street, for the purchase of which negotiations are now pending. The syndicate propose to invest $1,000,000 in the purchase of a site, erection of a plant and developement of he works, and will give employment to 800 hands when in full operation.

Aluminum Bronze in Germany.

According to *Kuhlow's German Trade Review*, at the end of last month the large dynamo plant of the Lauffen-Neuhau-en Company was put in operation. The daily output is now 300 kegs of aluminum or 3,000 kegs of 10 per cent. aluminum bronze daily.

THE Mutual Benefit Association of the Michigan Stove Foundry, Detroit, reports for the last half year: Cash on hand and receipts of the six months, $1,224.24; disbursements, $964.57. The latter was expended in sums of from $1.25 to $120, to forty-five workmen who were temporarily disabled by sickness or injury. Their association was organized in 1882.

During 27 years of protection our manufacturers grew from $2,000,000,000 to $7,000,000,000, and our importations from $462,000,000 to $762,000,000. Yet the supporters of the Mills bill insist that we do not import enough.

LAKE SUPERIOR IRON NOTES.

Special Correspondence to the IRON TRADE REVIEW.

FLORENCE, Wis., September 10.—The lake shipments of ore up to the close of the past shipping week aggregated 2,806,177 tons. The total local and all-rail shipments will swell the season's output to over 3,000,000 tons. The shipments by districts are as follows: Marquette, 1,113,103 tons; Gogebic, 810,055; Menominee, 661,662; Vermilion, 221,357 tons. As fully two and one-half months yet remain before the close of navigation, and as at least two-thirds of the amount of ore previously estimated by the REVIEW as the season's output has already been forwarded, it is reasonably certain that the total output from the Lake Superior district will exceed rather than fall below 4,000,000 tons. The leading shippers in each of the four ranges are making strenuous efforts to increase their shipments during the current month, but they are embarrassed to a certain extent by the scarcity of miners. The working forces of nearly all of the mines on the Menominee and Gogebic ranges are being increased as rapidly as men can be had, though the mine owners find great difficulty in procuring skilled miners. It is estimated that, on the Menominee range alone, there are at least 1,000 less miners employed than there were a year ago this time. The reason for this state of things, it is said, is that early in the season the working forces at the leading mines were materially reduced, and hundreds of miners sought employment in the Iowa coal fields, many, too, seeking homes in Washington Territory, and in other far Western mining regions. Notwithstanding the scarcity of skilled men, however, the mines in this district continue to be actively wrought, and a few of the properties have already exceeded their total last season's output. On the Menominee district the aggregate lake and all-rail shipments at the close of last week were about 700,000 tons, leaving only 300,000 tons to be shipped during the balance of the season to bring the total output up to 1,000,000 tons.

Southern Iron Again.

The New South, Birmingham, Ala.

Birmingham is selling iron in Cleveland, Chicago and other distributing centres of the North and West, at a price that is causing uneasiness and apprehension among the producers of the metal in those sections. The trade journals reflect this feeling, as in nearly every issue, reviewing markets, they exclaim, "Southern iron is becoming more and more a disturbing element." It all means that in the near future the South will control the iron market of this continent. The production here is now limited. But furnaces are going up every day. They are multiplying fast, and in a little while there will be enough of them to enable the iron makers of this section to fix prices and force the producers of Pennsylvania and Ohio to sell at those prices or quit the business.

It must be borne in mind that freight rates are a present against Birmingham. Thus, it costs about $4.50 to get a ton of iron from here to Cleveland, while the Pennsylvania producer can get a ton to the same place at less than $2. If Birmingham can undersell Pennsylvania and Ohio in their own markets, with these odds against it, what can we expect the place to do when its production is increased a hundred fold, and when through better transportation facilities, by water as well as rail, it secured reasonable freight rates to distributing centres in the East as well as West and Northwest? If Southern iron is a "disturbing element" now, when it is in its swaddling clothes, what will it be a few years hence when it becomes a full-grown man?

Saves Time and Money.

In the interesting summaries of news in the *Railroad Gazette*, is an estimate of the saving of time and money to passengers by the railway. In the case of London it is estimated that about 500,000 persons travel to and from their business every day. For these the railway economizes at least two hours a week, or five days a year. This to 500,000 people would mean 2,500,000 days, or an economy of 8,300 years of 300 working days each. If the average earnings of these people be estimated at $500 yearly, there will be a total money saving—in the sense of time being saved—of $4,150,000 per annum.

PARISIAN architects are very much opposed to the great 1,000-feet tower M. Eiffel is now building for the coming exposition. They say that it dwarfs by its proportions the height of the other buildings, that it is neither beautiful nor useful, and will benefit nobody but M. Eiffel himself and those associated in his enterprise.

BOILER STEEL.

BY FRANK C. SMITH.*

In the manufacture of boiler material, the first requisite is a mass of metal of perfectly homogeneous or uniform character, capable of being rolled. This mass must be large enough, and of proper shape to be rolled handily into large sheets. Wrought iron is not a good material for this purpose, largely because it cannot be obtained in a homogeneous mass of sufficient size. The difference between wrought iron boiler plate and what is known as steel boiler plate, is that the blooms which are necessarily welded together in making wrought iron boiler plate are melted into one mass in making steel plate. That is, commencing at the start in either steel or wrought-iron plate, the ores are first smelted in the blast furnace, the product of which is cast iron, as seen in the "pig." These pigs are then melted in a puddling furnace, the product of which is the puddled ball or a spongy mass of isolated particles of iron weakly bound into one mass by the melted cinder, slag, etc.

To bring the particles of iron into contact, so they may unite and form one mass of iron, it is necessary to separate the cinder, etc., from them, which is accomplished by the mechanical action of steam hammers, rolls, squeezers, etc. The mass is then rolled into muck bar, which is cut up cold, by shears, piled, heated and welded together again, the latter process being repeated as the purer result is desired. The result is the wrought iron bloom. In making wrought iron plate, a large number of these blooms, owing to their small size, are heated and welded together in order to obtain a mass large enough—1,800 to 3,000 lbs., according to the size of sheet required—to roll in a single sheet. As the ingot from which wrought iron boiler plate is rolled is made up from the numerous smaller blooms bound together by welding, it follows that as welding at best is but a partial process of cementation owing to the cinder and slag which cannot be entirely freed from the iron, and which are found in streaks all through the ingot, preventing homegeneity in the slightest acceptance of the term, that the resulting sheet is made up of streaks of iron separated by spots and streaks of cinder, resembling, to a certain extent, several thin sheets of brass held together by the process of "sweating" soft solder between them, which, if put into service, as a side sheet in a locomotive fire-box, would result in the melting of the solder and of the swelling or bagging out of the sheets closest to the fire, which, in wrought-iron plate, is known as "blistering." That is, the cinder, etc., in wrought iron boiler plate is similar to the soft solder in the supposed case of brass sheets. The following, from Alexander L. Holly's works, on the "American Locomotive," and who was afterward the father of the Bessemer process in America, is to the point: "There appear to be four principal defects in our fire plates, blistering and cracking, resulting from a comparative want of homogeneity, corrosion and comparatively small conducting power. The comparative want of homogeneity in iron is both an indirect and a direct cause of its ultimate failure. It facilitates the formation of blisters in the manufacture of the plate, and it offers less resistance than copper to the trying effects of fire.

"The difference of temperature to which its respective sides are exposed, caused unequal expansion and contraction in even a quarter-inch plate. This, by constant repetition, sensibly affects the cohesion of the particles of any compound substance. Were iron more nearly pure and the disturbance of temperature act on simply molecules of metal, without the interposition of cinder, the deterioration would, of course, be less rapid. The failure of all very 'raw' iron under alternate compressive and tensile strains illustrates this fact. Blistering is due chiefly to the imperfect welding of the component parts of the pile of blooms composing the plate, the imperfect weld being incident to the oxidation of the surface while heated. Many of the cheaper kinds of plate are made of a pile of three blooms; the outside strata are sound and reheated; the inside strata are "raw," poor iron. Such plates are, of course, very liable to blister. The experience with the cheaper boiler irons is that very large plates are soundest at the edges, and especially weak and liable to blister in the center.

"This is attributed to the inadequate heating of the central part of the pile, causing an imperfect weld. But when the pile is considerably flattened under the hammer, and then heated, its center is, of course, thoroughly softened, and the difficulty mentioned is not experienced so often. Indeed, such plates are found soundest and strongest in the middle, the edges being more strained by the process of rolling, and probably contain some cinder which has been worked from the inside of the pile. Large plates may be made from single blooms, if the central part of the bloom is so softened by reheating and gradual flattening as not to modify the texture and soundness of any part of the iron. Plates thus made, and avoiding the difficulty mentioned, are vastly superior in other particulars, etc. Good wrought iron boiler plate is unquestionably superior to poor steel plate; but, notwithstanding all possible care in the manufacture of iron plate, the failures from "blisters" occur much too frequently to make it a safe material, even when it is the best, to use in boiler fire surface, and for this reason it has entirely gone out of use in locomotive fire-boxes.

"The crucible process of making steel is the oldest, commercially speaking, and for some purposes the best—that is, when steel is wanted in small quantities of considerable purity. It is a failure when large masses of homogeneous character are required, as in the case of boiler plate. Its shortcomings in this respect are due to the process of manufacture, which, as is well known, consists in melting wrought iron, etc., in a crucible holding generally from 80 to 125 lbs. To obtain a mass large enough to make boiler plate, it is necessary to pour the contents of from twenty to fifty crucibles into one mold to form an ingot. As the 'steel' is made in each crucible, it follows that in thirty crucibles we have thirty different kinds and grades of steel in one sheet. The result, when subjected to the trying conditions found in a locomotive fire-box is, of course, disastrous to the majority of cases, as homogeneity or absolute uniformity of the metal in this service is one of the most important elements found in long-lived fire-boxes.

"In the ordinary open-hearth process, from six to twenty tons are made at a heat. The process consists of a melted cast iron bath in a Siemens-Martin furnace. Into this bath the wrought iron blooms (which, in wrought iron boiler plate, would be piled and welded together, as already described) are placed and melted together, with certain small quantities of ferro-manganese, spiegeleisen, etc., which, when thoroughly mixed, is tapped off and run into ingots of from 1,500 to 4,000 pounds each. This process of obtaining the ingot by melting or fusing the wrought iron blooms, and then casting them into a single mass large enough for a plate, is evidently far superior to the old process in wrought iron plate of welding them. If crucible steel could be obtained by manufacturing it in one large crucible in place of many small ones, the steel in each crucible of which is of a different individuality, so to speak, the result would be better than the open-hearth process, as the crucible process starts with the purest of refined iron, while the ordinary open-hearth process requires a bath of necessarily crude and unrefined iron (cast iron), or from 20 to 50 per cent. of its product. Thus, while the crucible process gives poor results in boiler plate, owing to a want of homogeneousness, the ordinary open-hearth process is short in its requiring a bath of cast or crude iron, forming a large proportion of its product, which is vitiated to the extent of the cast iron bath.

Certain steel works in Pittsburgh have in operation a process which does not require a cast-iron bath, but allows of making large quantities at a heat, thus combining the purity of the crucible process with the uniformity of the open hearth. The influence of the cast iron bath on the product is, of course, in proportion to its fractional part of the product. The kind of cast iron is, of course, largely influential on the result. Irons specially free from phosphorus are sought for this purpose. As wrought iron may be purified to any extent, the purity of the open hearth furnace product is necessarily due very largely, if not entirely, to the bath. Open hearth boiler steel, it will be seen, is simply an addition to the process of making wrought iron boiler plate, as it is identically the same up to the point where the metal assumes the form of blooms, and as before stated, the iron boiler plate is rolled from an ingot melted or fused into one mass. The distinction between wrought iron and steel in several European countries is that a compound of iron which when heated and cooled in water does not harden is iron, while one that does is steel, but in the American acceptance such compounds of iron as have been cast from a fluid state into a malleable mass are steel, and it is evident from the foregoing that this is the chief difference between wrought iron and open hearth steel, as no boiler steel which when heated and cooled in water and becomes harder is fit for boiler purposes. In fact, this treatment should anneal the steel or soften it, if the material is fit for boiler use. It is a safe practice to reject every sheet which hardens by working or flanging, or by cooling in water, as absolutely unsafe for fire surfaces. The constituents of boiler steel are carbon, phosphorus, manganese, silicon and sulphur, and, of course, metallic iron. The best compound of iron for any purpose is one which approaches nearest to containing nothing save pure iron and carbon.

For boiler purposes the carbon may vary from .10 to .20 for different tensile strength, and increasing the carbon as the harder and stronger material is required to 1.00 and 1.25 or upward. The effect of phosphorus is more influential than any other constituent save carbon, and the value of steel is in proportion as phosphorus is absent. Its effect is to harden steel, crystallize it, decreasing ductility and promoting brittleness and tendency to crack, and it is the greatest enemy boiler steel has to contend with. From .035 upward steel should not be used for fire-box purposes, though much steel is used with phosphorus up to .070, and it is hardly necessary to say that it is such sheets that crack. Phosphorus is the great bane of boiler steel. The effect of silicon in a very reduced degree is similar to phosphorus, but when it is reduced to .015 to .020 its effect is *nil*. Manganese is beneficial in practice up to .30 or .32. It promotes malleability, toughness and strength. Sulphur is an enemy to steel, and is never found in good fire-box steel.

All of these elements save phosphorus are comparatively easily controlled, and, other things being equal, the value of fire-box steel is dependent on the absence of phosphorus. The writer has seen the analyses of some 450 locomotive fire-boxes which had been in service and failed in from two weeks up to 12 years. The constituents were practically the same in all of them save phosphorus, which was up to .070 in the short-lived ones, and as low as .020 in the long-lived ones. The average fire-box steel sold averages .035 in phosphorus, but the steel made by the new process runs as low as .010 in phosphorus. Tool-steel makers (crucible) purchase the scrap steel cut off in squaring up sheets, and value it according to its freedom from phosphorus. For instance, .020 per cent. phosphorus is worth $55 per ton, while .030 to .040 is worth but $25 per ton. The purest steel (crucible) in the world is that used by watchmakers and engravers, and it has but .008 in phosphorus. The best tool steel found in America has .012 of phosphorus, and is unfit for fine watchmaker's tools, etc.

Ordinary tool steel has .018, while common tool steel runs to .025, and above .025 in phosphorus steel is useless for tool steel purposes. The conductivity of different metals for heating, taking silver at 100, is as follows:

Silver	100
Copper (rolled)	74
Steel with not over .010 of phosphorus	60
Steel up to .025 in phosphorus	51
Ordinary fire-box steel up to .035	44
Good wrought iron	40

Purity of steel has very much to do with economy of fuel. For instance, the writer has seen steel boilers on a tow boat which analyzed .040 in phosphorus, replaced with new ones exactly similar in every respect, except in purity of the steel, it had .011 in phosphorus. The boat with the new boilers did better for a test of six months by 17 per cent. Another case was that of a steam fire engine which had a boiler replaced with a new one. The old boiler had .050 in phosphorus, while the new one had .013. When new the old boiler had never generated steam at five pounds pressure in less than six minutes. The new boiler, which was identically the same as to size, etc., generated five pounds pressure in 3½ minutes.

Pure metal is the ideal metal for fire boxes, on account of its conductivity of heat and extreme ductility, which allows of its stretching to accommodate a strain, in place of cracking as poor steel does. A compound of iron which most closely resembles copper is, then, the best metal for fire-boxes, and to get such a material depends chiefly on its freedom from phosphorus.

*In Master Mechanics' Report.

THE Fort Wayne Company has just put on the road four monster engines, which weigh sixty-five tons each. These engines are calculated to make the run between Alliance and Crestline, over one hundred miles, without stopping for coal or water. The water tank of each engine has a capacity for two hundred barrels of water, and the coal supply will be ten tons.

THE work of constructing the Manchester Ship Canal goes on smoothly, and we might add, with extraordinary rapidity. Twenty-two locomotives and eleven steam navvies are employed in digging out the channel of the canal, and 1,700 men are kept at work day and night.—[Glasgow Engineer.

Industrial Notes

Blast Furnaces:—

McClure & Schuler, of Pittsburgh, have contracted to erect three fire-brick hot blast stoves at the furnace of the Williamson Iron Furnace, Birmingham, Ala.

Fannie Furnace, operated by J. C. Hamilton, Shawnee, Ohio, trustee, will resume operations in a few weeks. A new bosh has been put in, general repairs have been made, and a new brick casting house, 37x85 feet, is being put up to replace the old one, recently destroyed by a wind storm.

Recently the report has been extensively published that the Jackson Iron Company, of Fayette, Mich., were considering the advisability of removing their furnace plant from its present location, in order to secure better facilities for obtaining fuel. We are authoritatively advised that there is no truth in the rumor whatever. The company are making extensive improvements to their plant at the above place, with the intention of considerably enlarging their capacity for the manufacture of charcoal pig iron. They have no intentions whatever of moving from their present location.—[Iron Age.

The syndicate of creditors who bought the Pittsburgh plants of Graft, Bennett & Co., will blow in Clinton furnace in about two weeks. They will soon afterward start the rolling mill on the South Side (Clinton), and they will also likely start the Millvale Mill before winter sets in. The Grafton furnaces, at Leetonia, Ohio, formerly owned by Graff, Bennett & Co., have been leased by W. D. McKeefrey, of Sharon, Pa., and will be put in blast this week. The annual capacity of the two furnaces is 20,000 tons each.—[American Manufacturer, Pittsburgh.

Rolling Mills:—

The Reading Iron Works started up on the 27th ult. with a force of 230 men, who are paid an increase of five per cent over the wages paid before suspension.

Moorhead, Brother & Co., of Pittsburgh, proprietors of the Vesuvius Iron and Nail Works, located at Sharpsburgh, Pa., are adding a new heating furnace to their plant, which is an addition to the guide rolls. The motive power, which has heretofore been insufficient, has been increased by another engine, which has just been erected.

The North Chicago Rolling Mill Company's steel rail mill at South Chicago, will resume operations on the 17th inst. At their North Chicago mill they have gotten well started on the steel I beam business and are turning out this product at the rate of 600 tons per week. At present there is a very good demand for this class of material.—[Industrial World.

Wm. Clark's Son & Co., proprietors of the Solar Iron Works, at Pittsburgh, are about to place in their puddle department a rotary squeezer of 50 to 60 tons weight, which is to be driven by a reversing engine, so that in case of a "sticker" the ball can be backed out. The machine is being constructed by the Lewis Foundry & Machine Company, Limited, also of Pittsburgh.

The finishing department of the Union Rolling mill started to work, full handed last Monday morning, and through the incapacity of the gas producers, and not being able to get the gas reversers to work properly, the finishers had to quit work at night. The producers are being taken out and larger ones are to be put in their place. The change will be a great inconvenience to the company, and the loss of time by the workmen will also be felt. They have been idle now ten weeks. It is expected the mill will be ready to start up on Thursday, 13th inst. All the puddling furnaces are at work.—[South Cleveland (O.) Advocate.

Steel Works:—

The Wayne Iron & Steel Works of Brown & Co., are now shut down. On Friday last, two pieces of steel were spoiled, and the firm demanded that hereafter the heater shall be held responsible for such losses. To this the men would not agree, and a shut-down was the result. At this writing a conference to adjust the difficulty has been arranged for.—[American Manufacturer, Pittsburgh.

The Lackawanna Iron & Coal Company, of Scranton, Pa., being no longer essentially a producer, as the entire product of its collieries is consumed by its steel works, has adopted a new title, a new charter having been obtained, and will be known as the Lackawanna Iron & Steel Company. The capital stock was also increased from $1,000,000 to $3,000,000. The new charter relieves the company of any individual liability of its members. There is no change in the management, as no election of officers was held, and hereafter the store will be a separate concern.

It is stated that an effort is being made to start up the plant of the Cartwright Iron & Steel Company, at Steubenville, Ohio, which made an assignment about two months ago. The works were formerly known as the Alikanna Rolling Mill. The unsecured claims amount to $45,000. Some of the heaviest creditors now propose that the company give long-time notes for 40 per cent. of the indebtedness in full satisfaction of the same, the notes to bear 6 per cent. interest. Then the company will spend $10,000 in making betterments to the plant and resume operations. The plan is likely to be accepted by the balance of the creditors, as a possible means of making good a portion of their claims.

Some months ago the Carbon Iron Company, of Pittsburgh, secured control of the Fort Pitt Iron & Steel Works, in that city, and have since been busily engaged in making extensive additions and changes at the plant with the object of the making the manufacture of structural steel a specialty. Horace W. Lash, formerly with Park Brothers & Co., Limited, of the Black Diamond Steel Works, was secured as a general superintendent. Mr. Lash is the inventor of the well-known Lash steel melting furnace. The company have just finished the erection of an open-hearth steel-melting plant, consisting of two 15-ton Last steel melting furnaces, and have commenced the manufacture of steel. They have also put in a large universal mill that was completed on the 1st of September to furnish universal rolled plates 36 inches wide of any length or thickness required for structural purposes. Also slabs from 6 to 30 inches wide, and from 2 to 6 inches thick, and blooms from 4 to 8 inches square. The mill has been run to work down bearings.—[Iron Age.

Machine Shops:—

The Canton, (O.) Car Company will change its name in a day or two to the J. H. McLain Machine Campany.

The New York Feed Water Purifier Co., New York, N. Y., has been incorporated. Capital, $50,000. William J. Smith and others, incorporators.

The Ottumwa (Iowa) Iron Works have been extending their plant and are about to set up a new 80 horse-power engine of their own make, to furnish the additional power needed.

At the recent sale of the assets of Smith, Beggs & Ranken Machine Company, of St. Louis, John D. Ranken, a member of the firm, purchased the realty, buildings, tools and patterns for a sum slightly exceeding $63,000. Stock, finished and partly finished, and other minor assets will be sold later on.

Work will soon be begun on an addition of 150 feet to Witherow's Works, this city, made necessary by the heavy contracts now on hand. The enlargement will be of handsome design. When the extension is completed the machine shop of the Works will be among the largest in Western Pennsylvania.—[New Castle, (Pa.) Guardian.

The Cleveland Twist Drill Company's new works are progressing rapidly. They expect to get into the buildings on November 1. The main building is 100 x 40 feet, with tempering and forge shops adjoining. New machinery will be added to keep up with increase in business.

Eynon & Marshall, engine builders and machinists, of Cleveland, are receiving numerous orders for their slab-milling machine. On account of an increase of orders, the company have been compelled to erect a new factory, which they expect to occupy in November next.

Messrs. Curtis & Curtis, of Bridgeport, Conn., manufacturers of the Forbes patent die stock, pipe cutting and threading machinery, are still running overtime in their new works. Their July shipments were the largest of any month since they have been in business, but they overran even this in August, when the shipments exceeded those of July by over $500. They are particularly busy filling orders for their power pipe machines, among which are orders from South Africa, Texas, Montana and San Francisco.

Foundries:—

The Cleveland Board of Water Works Trustees will soon purchase about 20 miles of new pipe.

Rockwell King is about to build a $12,000 foundry and factory building on Huron street, Chicago, 85x60 feet. It will be two stories high.

The iron foundry of Laurens, South Carolina, owned and controlled by Messrs. R. H. Hudgens and J. J. Pluss, will soon enlarge its capacity for work on an extended scale.

Hardware:—

Incorporated. The Celina Tack and Nail Co., Celina, O. Capital, $20,000. B. S. Taylor and others, incorporators.

The Al Baldwin Machine and Hardware Company, New Orleans, La., has been incorporated, capital stock $400,000, with privilege to increase to $500,000.

Elbel & Co., Canton, O., manufacture their line of saddlery hardware and specialties solely now, having given up outside work, as it is all they can do to handle their own.

Rumors continue to prevail that the New Castle, Pa., Wire Nail Co. will erect a Wire Rod Mill in connection with their works. It is said the structure will be 1,000 feet in length, if built.

The Iron City Chain Works, of James McKay & Co., on Twenty-ninth street, Pittsburgh, resumed operations on Monday, the 27th ult., after a stoppage of nearly two months to make repairs. Orders at this establishment are reported as being rather scarce.

The McCosh Iron and Steel Company at Burlington, Iowa, are running their wire nail department full time and will soon start up their barbed wire works, which have recently been closed down for repairs. They have put in additional engine and boiler capacity, with a view of having sufficient power to operate a wire drawing plant of their own, which they contemplate putting in at some future date, should the market price of wire advance too freely.

Miscellaneous:—

The Andrews Iron Company has added a patent annealing box to its plant for annealing sheet iron.

Incorporated: The Oakland Iron Works Co., Oakland, Cal. Capital, $50,000. George Cottrell and others, incorporators.

The Hughes Steam Pump Co., Cleveland, inform us that they have just made quite a large export shipment of pumps through their New York agents, Messrs. Donegon & Swift.

Incorporated: The Consolidated Steam Generator Company, of East St. Louis; capital, $1,500,000; incorporators, Edward Sniffen, William J. Woosley and James D. Ryan. The Tanner Anti-Friction Wheel Company, Chicago; capital stock, $500,000; incorporators, Warren G. Purdy, Frederick W. Porter, Samuel W. Turner, Frank L. Strong and George H. Fergus.

Messrs. E. W. Poorman & Co., have nearly completed their new shops. The company will soon put in complete wood-working machinery. Next Spring they expect to erect a large foundry on their new site, the building to be 65x150 feet. Poorman & Co. manufacture well-drilling machinery and tools, boilers, etc. The works, which have been idle since their removal from the Old Canton car shop buildings and pending the completion of the new shops, will employ fifty or sixty men, which force will be increased as business warrants.—[Canton (O.) Repository.

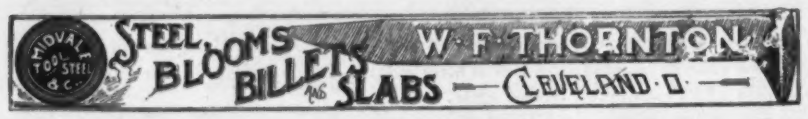
Bids for building the superstructure of the Seneca street bridge, Cleveland, were opened in the office of the Board of Improvements last week. There were five proposals, two of the bids being informal. The bidders were required to furnish figures for the 215 tons of iron and the 35,000 feet of lumber required. The Pittsburgh companies did not furnish any sureties and, although their bids were recorded, they were not considered. The bid of the Variety Iron Works was the lowest, the price for the iron being $74.50 per ton, and for lumber $30 per thousand feet. The King Iron Bridge & Manufacturing Company offered to furnish the iron for $96 per ton and the lumber for $28.50. The Detroit Bridge & Iron Works bid $105 per ton for the iron and $33 per thousand feet for the lumber. The totals are as follows:

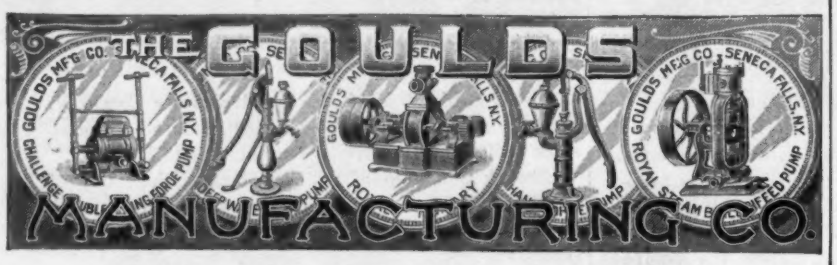
Variety Iron Works	$17,067.50
King Iron Bridge & Mfg. Co.	21,607.50
Detroit Bridge & Iron Works	23,730.00
*Pittsburgh Bridge Company	26,790.00
*Shiffler Bridge Works, Pittsburgh	27,062.50

*Informal.

The contract for the substructure has already been let at $46,000, and the engine house yet to be built will cost $5,000, making the total cost of the structure about $70,000. The plank roadway temporarily built on Canal street, will probably be paid for from the bridge fund, and this, together with the advertising and other incidental expenses, will bring the outlay up to about $75,000, which is $10,000 below the estimated cost.

THE ship canal companies at Manchester, Eng., employ 6,000 men.





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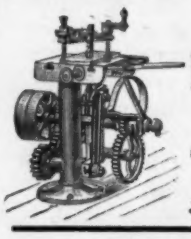

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MARKET REVIEW.

OFFICE OF IRON TRADE REVIEW.
CLEVELAND, O., WEDNESDAY EVENING, September 12, 1888.

Iron Ore.

The dealers all agree that they are practically sold up, but this state of affairs does not seem to be a serious drawback to the production of round lots of ore—if the consumer appears willing to meet the high vessel rate. At all events, there are reported for the week, three sales of non-Bessemer aggregating 11,000 tons, and one block of 5,000 tons of Bessemer, the latter bringing $5.50. The shipments are falling off in proportion as the rate goes up, and not a pound is being sent down in excess of requirements. A canvass of the mines represented here justifies the statement that 75 per cent. of the '87 output will amply cover the season's work. This includes new and wild ores as well. Coke, while still selling at $1.00, is momentarily expected to advance. The coke drawers and workers have demanded an advance, which, in some instances, has been granted, but it is not known whether the operators will return to the old rate by easy stages, or at one jump. Furnacemen are preparing for the advance, and the yards are being rapidly stocked up with coke. The vessel owners say that the close of the season will see some $2.50 Ashland charters. While such charters may be made, they will be as scarce as hen's teeth, and all the ore they will bring down at that rate will go into an exceedingly small compass.

Pig Iron.

Although the Pittsburgh market is a trifle weaker, the local market is full and strong, and the prices realized are among the best of the year, thus far. There is prevalent a general feeling of confidence, brought about by the large consumption of iron and the continued strong demand in the face of the fact that most of the furnaces have disposed of their output up to the close of the year. The sales reported are not large in quantity, but were made at good figures, and the tendency is decidedly favoring an advance. We quote, f. o. b. cars, Cleveland, four months:

CHARCOAL PIG IRON.

Lake Superior Charcoal all numbers	22 00@24 50.

BITUMINOUS AND COKE IRON.

No. 1 Bessemer	$18 70@19 20
No. 1 foundry, all lake ores	17 70@18 70
No. 2 same	16 70@17 70
No. 1 foundry, lake ores, with cinder mixture	17 20@17 70
No. 2 same	16 20@16 70
No. 1 silvery, native Ohio ores	16 50@17 50
No. 2 same	15 50@16 50
No. 1 gray forge, red short	16 70@17 20
No. 1 gray forge, neutral	16 20@17 70
No. 1 American Scotch (Black Band)	17 70@18 20
No. 2 American Scotch "	16 70@17 70

Manufactured Iron.

The demand for bar iron continues, and the agricultural works are liberal buyers at this time. The stocks are small, and none are accumulated. The price is $1.65@$1.70. Common sheets are also in demand at $2.75 for No. 24, at the mills. None can be purchased in the market at present, the makers declining to deliver until October 15.

Scrap Iron.

The corner in Old American rails continues, and those compelled to purchase must pay about $25. Under the circumstances, many mills are considering the advisability of consuming pig iron, which will insure to them a better quality of the finished product and, consequently, a better price,

ST. LOUIS PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by Rogers, Brown & Co.

The market has been quiet for the past two weeks. Business transacted has all been at full prices, as there are no sellers at the figures prevailing a month ago. Missouri charcoal iron that went so slow about the middle of August, has got back into line with other brands, the advance being $1 to $2 per ton. Southern coke No. 2 foundry and mill grades are scarce, and almost impossible to get for early delivery. Our cash quotations, f. o. b., St. Louis, are (Sept. 8):

Charcoal Foundry—Southern No. 1, $18.00@$19.00; Southern No. 2, $18,00@$18.50; Missouri No. 1, $17 00@17 50; Missouri No. 2. $16,50@$17.50. Coal and Coke Irons.—Ohio Softeners, $18 00@21 00; Southern No. 2, $17 00@$17 50. Mill Irons.—Missouri, $16 00@16 25; Southern No. 1, $15 50@$16 00; Southern No. 2, $15.50@16 50. Car Wheel & Malleable Irons.—Lake Superior, $20 50@21 50; Southern, $20 00@24 00; Connellsville Coke, East St. Louis, $4 45; Connellsville Coke, St. Louis, $4 60.

CINCINNATI PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by Rogers, Brown & Co.

Business for the past week has been satisfactory in volume, and prices have been fully maintained. There is no disposition on the part of most pig iron makers to boom the market. On the contrary, the most conservative manufacturers oppose much further advance in prices, knowing well from experience that an advance of several dollars per ton is immediately followed by higher prices of coke, ore and labor, increasing cost to a danger point. Some furnaces have marked up prices $1.50 to $2.00 per ton, but more as a means of preventing further sales than of pushing the market. Southern mill irons are practically sold up for the rest of the year. We quote for cash, f. o. b., Cincinnati (Sept. 8):

HOT BLAST FOUNDRY.—Ohio and Southern Coke, No. 1, $17 50@$18 50; Ohio and Southern Coke, No. 2, $16 50@$17 50; Ohio and Southern Coke, No. 2¼, $15 50@$16 00; Ohio Soft Stonecoal; No. 1, $17 00@$17 50; Ohio Soft Stonecoal No. 2, $15 50@$16 00; Mahoning and Shenango Valley, $17 50@$18 50. CHARCOAL IRON.—Hanging Rock Charcoal No. 1, $21 00@$22 50; Hanging Rock Charcoal No. 2, $19 50@$22 00; Tennessee and Alabama Charcoal No. 1, $18 50@$19 50; Tennessee and Alabama Charcoal No. 2, $17 50@$18 00. FORGE—Strong Neutral Coke, $14 75@$15 00; Mottled Neutral Coke, $13 50@$13 75; Cold Short Coke, $14 50@$14 75. CAR WHEEL AND MALLEABLE—Southern Car Wheel, $20 00@25 00; Hanging Rock Cold Blast, $22 00@$25 00; Lake Superior Malleable & Car Wheel, $21 00@$22 00.

DETROIT PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by William F. Jarvis & Co.

The market continues active and very strong. Several large sales of Lake Superior charcoal have been made during the week at from 50 cents to $1.00 per ton higher than ruling prices in July and August. The majority of the Mahoning Valley Furnaces are refusing orders, unless at $1.00 per ton advance, and some are not in positions to fill orders promptly even if price is satisfactory. Silvery irons have been the slowest in putting up their prices, but they too have finally decided to ask an advance of 50 cents per ton. The fact that several parties have been seeking iron for speculative purposes, and some few purchases made, has strengthened the market and very little if any iron is now to be found at less than the regular prices. With a strong market we quote as follows (Sept. 10):

Lake Superior Charcoal, all numbers, $20 00@$20 50; Lake Superior Coke, all ore, $19 75@$20 25; Lake Superior coke, cinder mixed, $18 50@$19 00; Standard Ohio Blackband, $19 75@$20 25; Southern No. 2, $17 75@$18 25; Southern Gray Forge, $16 25@$16 75; Southern Silvery, $17 00@$17 50; Jackson County (Ohio) Silvery, $18 50@$19 00; Old Wheels, $20 00@$20 50.

LOUISVILLE PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by Geo. H. Hull & Co.

Business during the past week has been fair, and buyers have been compelled to pay market prices, furnaces not finding it necessary to make concessions at all. There is a feeling among buyers that the coming week is to decide whether the market is to decline or another advance be made, and that the position of the Eastern market will largely decide this. Old rails are stronger, sales having been made at $23, and $23.25 cars, Louisville, and offers on this basis have been made for large amounts for delivery through balance of year. We quote (Sept. 10):

Southern Coke, No. 1, Foundry, $17 00@$18 00; Southern Coke, No. 2, Foundry. $16 00@ $16 50; Southern Coke, No. 2¼, Foundry, $15 50@ $16 00; Hanging Rock Coke, No. 1, Foundry, $17 25@$17 75; Hanging Rock Charcoal, No. 1, Foundry, $21 00@$23 25; Southern Charcoal. No. 1, Foundry, $18 00@18 50; Silver Grey, different grades, $14 50@$15 25; Southern Coke, No. 1, Mill Neutral, $14 75@$15 25, Southern Coke, No. 2, Mill, Neutral, $13 75@314 75; Southern Coke, No. 1, Mill, Cold Short, $14 25@$14 75; Southern Charcoal, No. 1, Mill, $15 75@$16 50; White and Mottled, different grades, $13 50@$13 75; Southern Car Wheel, Standard Brands, $23 00@$24 00; Southern Car Wheel, other brands, $19 25@$21 25; Hanging Rock, Cold Blast, $22 25@$25 25; Hanging Rock, Warm Blast, $19 25@$20 25.

CHATTANOOGA PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by Lowe & Tucker.

The condition of the pig iron market still shows an advancing tendency, and while there is no particular excitement, there is a great reluctance on the part of producers to accept present prices. Many contend that prices will go considerable higher during the year, while others think that the top of the market has about been reached. Be that as it may, matters appear to be in a very satisfactory condition. There is more than a full demand for the capacity of the Southern stocks, and considerable buying is evidently being done for speculative purposes. Upon the whole, we place the figures at $1.00 to $1.50 higher than those that ruled two or three weeks ago.

CHICAGO PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by Rogers, Brown & Co., W. W. Backman, Resident Agent.

The only noteworthy features of this market during the past week were some large purchases of Lake Superior charcoal iron. It is understood to have gone at a shade less than $20 at Chicago. From what can be learned, most of the Lake Superior charcoal furnaces are now filled with orders for months to come, and conditions are very favorable for maintaining prices at the full current limit. No Southern irons are being sold here to speak of. Ohio softeners continue in good request. Old material of every kind is firmer.

CAR shops at Laredo, Tex., to be erected by the Mexican National Railroad, will cost $600,000.

THE BRITISH IRON AND STEEL INSTITUTE.

At the meeting of the British Iron and Steel Institute, August 22 and 23, at Edinburgh, Mr. Daniel Adamson, the president, in the chair, Sir James Kitson, of Leeds, was chosen president of the Institute for the succeeding two years. It was announced that the Autumn meeting in 1889, will be held in Paris, the desire of many members to visit America at that time having been waived, because it was thought that, on the whole, the holding of the exhibition in Paris in 1889, afforded a special reason why the invitation from that city should be accepted. Dr. Hunter, from the United States, assured the members that when they made their visit to his country they would have a welcome never yet accorded to any scientific body from Great Britain. The first paper was by the president, on "A Horizontal Compound Lever Testing Machine of 15,000 Powers, With a Further Recording Lever of 15,000 Powers." The second paper was by Mr. R. A. Hadfield, of Sheffield, on "Manganese Steel," which proved to be exceedingly interesting. The next paper read was by Mr. F. E. Cooper, resident engineer, "Description of the Forth Bridge." The total length of the viaduct will be 8,296 feet, or nearly 1⅝ miles, and there are two spans 1,710 feet, two of 680 feet, fifteen of 168 feet girders, four of 57 feet, and three of 25 feet, being masonry arches. The clear headway for navigation will not be less that 150 feet for 500 feet in the center of the 1,710 feet spans. The extreme height of the structure is 361 feet above, and the extreme depth of foundations, 91 feet below the level of high water. There will be about 53,000 tons of steel in the superstructure of the viaduct, and the material used throughout, is open-hearth or Siemens-Martin steel. That used for parts subject to tension is specified to withstand a tensile stress of 30 to 33 tons to the square inch, with an elongation in eight inches of not less than 20 per cent.; that subject to compression only, a tensile stress of 34 to 37 tons per square inch, with an elongation in eight inches of not less than 17 per cent. Sir Lowthian Bell introduced Mr. Thomas Curtis Clark, of New York, a member of the Institute of Civil Engineers, of this country, and a member of the Society of Civil Engineers in America, and also of the Institute of Mining Engineers. Mr. Clark said the work of the bridge was of such a novel nature, so different from anything which had ever been done before, that one felt an extreme modesty in giving an opinion upon it. He would direct their attention first to the point that the bridge was not only a very strong bridge, but that it looked very strong. It carried to the eye that appearance of stability which every large bridge ought to have. When people looked at the bridge they would see that it was a bridge that no wind, no gale, no tornado could upset. It would not be possible to appreciate fully the great architecture of the Forth Bridge, until the scaffolding and the various cranes and appliances which were now covering it were taken away, and until the main lines met in the centre. When that was done he believed it would be said that it was one of the finest pieces of architecture in the world. A paper by Professor J. Wiborgh, Stockholm School of Mines, describing a "New Air Pyrometer," was next read, followed by one on the "Chemical Processes Involved in the Rusting of Iron," by Professor A. Crum-Brown, of Edinburgh. "The Metallurgical Exhibits at Glasgow," were dealt with by Mr. W. J. Millar, C. E., and this paper brought the morning session to an end. Two further papers, one by Messrs. E. J. Ball and A. Wingham, on "The Influence of Copper on the Tensile Strength of Steel," and the other by Mr. Hugh Miller, on "Geology of the East of Scotland," were taken as read.

The *Ironmonger* (London) says that "Mr. Hadfield's tests and experiments are well worthy of being carefully followed by all who are interested in the metallurgy of steel of all kinds, seeing that they open up a field which will still bear a vast amount of investigation before it can be even approximately exhausted. To say that Mr. Hadfield has provided a new alloy would be, perhaps, to state the case too strongly, yet it cannot be denied that by the use of high percentages of manganese he has secured results which are entirely novel, and appear to show the way to an absolutely new sort of metal for various purposes. By boldly overstepping the boundaries previously set to the use of manganese, Mr. Hadfield has upset all former calculations, and has been enabled to show tests of his metal which are a little short of astonishing, even if they do not fully reach all that is expressed by that term."

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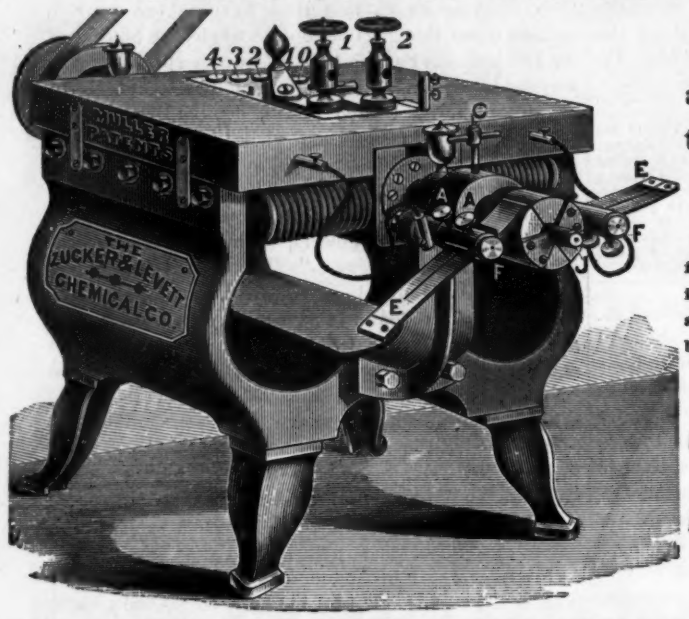

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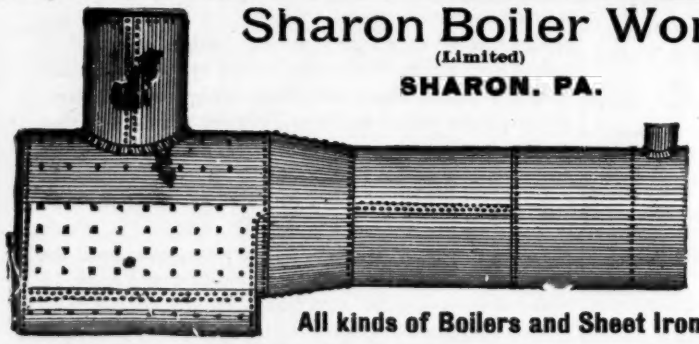

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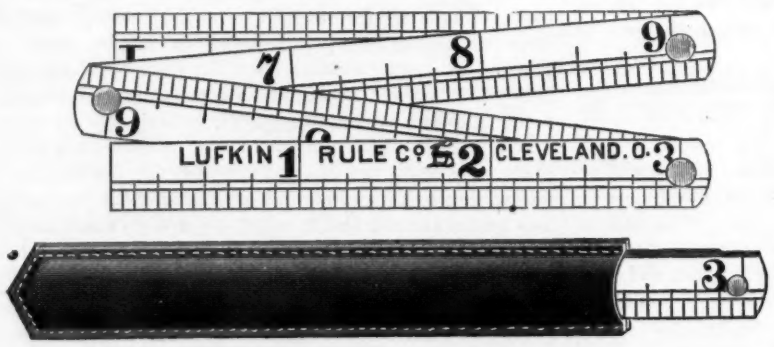

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U. M. C. & W. R. A.—P. E., 11up...3 10 }
U. M. C. & W. R. A.—P. E., 9&10...4 00 }
U. M. C. & W. R. A.—P. E., 7&8....4 90 }
Eley's B. E., 11 up....2 00
Eley's P. E., 11@20....2 80

Hack Saws.

Griffin's Hack Saws, complete....dis 40
Griffin's Hack Saw. Blades only....dis 40
Diamond Hack Saws and Blades....dis 25

Halters.

Jute horse and cattle ties....$13.50 gro. net.

Hammers.

Maydole s....discount 25@25&10
Atha new list, Jan 15.1887....dis 40&10@50
Magnetic Tack, No. 1, 2, 3, $1.25, $1.50 and $1.75, dis 30
Heavy hammers and sledges under 5 lbs, 36c. over 5lbs, 30 c....dis 70

Hand Cuffs and Leg Irons.

Providence Tool Co., hand cuffs, $15 ₱ doz....dis 10
Providence Tool Co., leg irons $25 ₱ doz....dis 10
Tower's....dis 15

Hardware—

Door or Thumb Latches.

Per doz	Nos. 0	1	2	3	4	
Sargent's	90	1 00	1 18	1 35	1 50	dis 60&10
Roggin's Latches						₱ doz. 30@35c
Bronze Iron Drop Latches						₱ doz. 70c net

Jap'd store door handles—Nuts. $1 62; Plate $1 10; no plate $0 88....net
Barn door....₱ doz $1 80, dis 25
Wrought chest....dis 50&10&10
Surface chest....dis 70
Flush chest....dis 70
Lifting....dis 70
Saw and plane....dis40&10
Hammer and hatchet....dis 25&5&2
Brad awl....₱ gross $2
Hickory firmer chisel, assort....₱ gross $4 50 } dis 40
Hickory firmer chisel, large....₱ gross $5 00 }
Apple firmer chisel, assorted....₱ gros $5 00 }
Apple firmer chisel, large....₱ gross $6 00 }
Socket firmer chisel, assorted....₱ gross $3 00 }
Socket framing chisel, assort....₱ gross $5 00 }
File, assorted....₱ gross $2 75 }
Auger, assorted....₱ gross $5 00 } 25
Auger, large....₱ gross $7 00 }

Hangers.

Barn Door. old patterns....dis 60&10 &10
Climax (Anti-Friction)....dis 55
Star....dis 40
Scranton....dis 25
Kidder's....dis 50&10
Terry's Patent 5 in., 12.00; 3¼ in., 10.00, dis 50 @
Paragon....dis 40
Richards....dis 20&10&10

Harness Snaps

German, new list....dis 40&10
Covert, New Patent, new list....dis 50&5&2

Hay Knives.

Lightning....per dos. $11.50 net
Electric....₱ doz $17.00 dis 30

Hinges.

Wrought Strap and T Hinges....65&10&2@70&10
Screw, hook and strap, 8 10 12 in....3¾@4
to 36 in....2¾@3
Screw hook & eye hinges....½ ₱ doz 1.50 } ...dis 10
⅝ 2.45 }
¾ 3.80 }
Gate, western....₱ doz $4 40, dis 55
Gate, N. E....₱ doz $7 00, dis 55
Gate, N. E. reversible....₱ doz $5 20, dis 55&15
Gate, Clark's, Nos. 1, 2, 3....dis60&10@60&10&0
Gate, N. Y. State....₱ doz $5 00, dis 55&15
Gate, automatic....₱ doz $12 50, dis 50
Gate, common sense....₱ doz pair $4 50, dis 50
Gate, Shepard's....dis 60&1

Hollow-Ware.

Stove Hollow-Ware, Ground dis....60&10&10
" " Undground....70&10
Enameled Kettles....dis 70
Saucepans....dis 40
Galvanized Tea-Kettles

Inch	6	7	8	9
Each	55	60	65	75

Hoes.

Garden, mortar....dis 65&5
Planter's, cot....dis 65&5
Canton....dis 65&5

Hog Rings and Ringers.

Hill's rings....$2 50
" ringers.... { Old Style....$3 00 / Improved....$4 50
Blair hog ringers....₱ doz $3 00

Hooks.

Bird Cage, Sargent's list....dis 60&10&10
Belt....dis 75&10
Clothes Line Sargent's list....dis 60&10
Ceiling Sargent's list....dis 55&10
Coat and Hat, Sargent's list....dis 55&10
Wire Coat and Hat, Gem....dis 45
Wrought Staples and Hooks & Staples, list Jan 12. 1887....dis8C&20
Wire Screw Hooks and Screw Eyes. dis 75&10
Hooks and Eyes—Malleable Iron....dis 70
Hooks and Eyes—Brass....dis 60&10&10

Horse Nails.

No.	10	9	8	7	6	
Ausable, ₱ lb	23	24	25	26	28	dis25&10to25&10&10
Putnam, ₱ lb	19	20	21	22	24	....dis 15

Essex....33⅓&5

Burden....₱ keg $4.25
R. I. Horse Shoe Co., Perkins' Imp. at factory....₱ keg $4 25
Mule Shoes, at factory....₱ keg $5.25

Hose, Rubber, Boston Belting Co's.

Standard....70
Extra....55&10
Best....45&10

Ice Picks, Chisels, &c.

Am. Ice Chisel Pol'd....₱ doz. $3.00, dis 20

Ice Cream Freezers.

American....50&10
Gem....55&10
Crown....50&10

Ice Tongs.

Champion....₱ doz $4.00, dis 25&10
Family....₱ doz $2.75, dis 20@25

Jack Screws.

Illinois Bolt Co. list....dis 70

Kettles.

Brass, 7 to 17 inches inclusive....₱ lb 22c. net.
Brass larger than 17 inches....₱ lb 24c.
Enameled and Tea Kettles....See Hollow Ware

Keys.

Eagle, cabinet, trunk and padlock...dis 33⅓ and

Knives.

Russell's Butcher....net
Moran's Shoe Knives....dis 20

Knobs.

Carriage, Japanned....₱ gross 80c. dis 60&10
Base, Rubber Tip....dis 70&10&5
Hemacite Door Knobs, new list....dis 40@40&10
Door Mineral....75c
Door Por. Jap'd....90c
Door Por. Por....3 00@3 25
Door Por. Plated....2 90@3 00

Ladles.

Melting, Sargent's....dis 55&10
Melting, Monroe's Patent, ₱ doz $4.00, dis 25&10
Melting, P. S. & W....dis 25&10

Lanterns

Tubular No. 0....$5.00 per doz
" " " 1.... 7 00
Tubular, Lift Wire, No. 0, ₱ doz.... 6 50
Tubular, Lift Wire, No. 1, ₱ doz.... 7 50
Police, Small, $6.00; Med., $7.25; Large, $9.75....dis20@

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Porcelain lined.....₱ doz $6 00, dis 25&35
Wood.....₱ doz $3 00. dis 35
The "Boss" .....₱ doz $2.50
Dean's No. 1. ₱ doz $6 50: 2, $3 25;3, $1 90....dis
Little giant.....dis 50

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Cotton Chalk.....dis 40
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₱ doz.	$14.00	$17.00	$19.00	$30.00	dis 40
Draw Cut Nos.	5	2	6	8	10
Each.....	$50.00	$75.00	$80.00	$225.00	400.00

dis 20@25

Woodruff's (P S & W) per doz No 100 $15 No 150 $18dis 45

Hale's—Nos. 11 12 13
$27 $33 $45 dis 70

Enterprise.....dis 33⅓

Mincing Knives.

Am. (2d quality), ₱ gro, 1 blade, $7; 2 blades, $12; 3 blades, $18.....net
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List July 14, 1887.....dis 70
Standard Penny Nails, ₱ keg card rate
{ Car lots.....$2 60
{ Less than car lots, $2 70

Nuts and Washers.

Size of bolt in.....	¼	5-16	⅜	½	⅝	¾	1
Square.....	8	7	5½	4¼	3¼	3⅛		
Hexagon.....	15½	11½	8½	6	5¾	5¼	5
Washers.....	9	8	7	5	4⅛	4½	4¼

In lots less than 100 lbs, ₱ lb add ½c, 1lb boxes add 1c to list

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Table (Humason & Beckley Mfg. Co.).....dis 40
Blake's pattern.....₱ doz. $2 00, dis 10
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Oakum.

Government.....₱ lb 8 c
U. S. Navy.....₱ lb 7¼c
Navy .....₱ lb 6½c

Oilers.

Zinc and Tin.....new list dis 60&10
Brass and Copper.....new list dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₱ doz.....dis 10@ 10&10

Packing, Steam.

Boston Belting Co .....dis 60
American Packing. .....10@11c
Russia Packing.....16c
Italian Packing.....16c

Pencils.

Faber's Carpenters' .....high list, dis 50
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Picks.

Railroad, 5 to 6 lbs.....$12 dis 60@60&5
... .. 6 to 7 lbs.....$13 dis 60@60&5

Pinking Irons.

₱ doz .....65c. net

Picture Nails.

Brass head, Sargent's list..... } dis 50&10&10
Brass head, combination list.....dis 50&10
Porcelain head Sargent's list, dis.....50&10&10
Porcelain head, combination list.....dis 40&10

Plane Irons.

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Pliers and Nippers.

Button's Patent .....dis 40
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Gas Pliers.....dis 50&10
Humason & Beckley .....dis 50
P. S. & W. Tinners' Cutting Nippers add 6 per cent. dis 10

Plumbs and Levels.

Standard list.....dis 70&10
Pocket levels.....dis 70&10
Davis' inclinometers.....dis 10&10

Post Hole and Tree Augers.

Samson Post Hole Digger..₱ doz. $36.00, dis 20&10
Eureka Diggers.....₱ doz. $15 00 @ $16.00
Champion.....per doz $9.00
Vaughan's Hollow Tube Post Hole.....$12.00 dis40

Potato Parers.

White Mountain.....₱ doz $5.00@$5.50
Antrim Combination.....₱ doz $8.00
Hoosier .....₱ doz $13.50

Pruning Hooks and Shears.

Disston's Combined Pruning Hook and Saw ₱ doz $18.00.....dis 25
Disston's Pruning Hook.....₱ doz $12.00 dis 25
Pruning Shears .....₱ doz 3.75@$4.00 net

Pulleys.

Hot House ..... discount 60&10
Japanned Screw..... discount 60&10
Brass Screw.....discount 60&10
Japanned Side.....discount 60&10
Japanned Clothes Line.....discount 60&10

Pumps.

Cistern, best makers.....dis 50@10&60
Pitcher spout, best makers...dis 60&10@60&10&10
Pitcher spout, cheaper goods... dis 70&5@70&10&5

Punches.

Saddlers' or Drive.....₱ doz. good quality, 65@75c
Bemis & Call Co.'s Cast Steel Drive.....dis 50&5
Bemis & Call Co.'s Springfield Socket.....dis 50&5
Solid Tinners.....₱ doz. $1.44, dis 55

Rails.

Sliding Door, Wrought Brass.....₱ lb 35c dis 20
Sliding Door, Iron, Painted... ₱ foot 6c dis 40&10

Rakes.

Cast Steel..... dis 65&5
Malleable ..... dis 65&5

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J. R. Torrey Razor Co.....dis 20
Wostenholme & Butcher..... $10 @£...dis 10
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Rivets.

Iron, Thousand, list November 17 .....dis 50
Iron, Ordinary, Cooper's Block and Carriage, list November 17.....dis 50
Copper .....dis 50

Rods.

Stair. Brass.....dis 25&2

Rollers.

Barn door, Sargent's list, ... dis 60&10&10
Acme (Anti-Friction).....dis 55

Rope.

Manilla. ½ inch and over.....11½c
Sisal, ½ inch and over..... ...11c

Rules.

Boxwood..... ..... discount 80@80&10

Sad Iron.

From 4 to 10 lbs.....per 100 lbs 3c
Self-heating.....₱ doz $9 net
Self-Heating, Tailor's.....₱ doz $18 net
Mrs. Potts's Irons, ... dis 40&10
Enterprise Star Irons.....discount 40&10

Sash Weights.

Per ton .....$22.50@$25.00

Saws.

Disston's Circular..... discount 45
Disston's hand panel, rip &c..... discount 25
W. M. & C., Champion Regular.....per foot 23c
W. M. & C., " Thin Back.....₱ ft 24c

Saw Frames.

White, Vermont..... ₱ gross $12 00
Red, polished & varnished ₱ doz $1.50, ...dis 25

Saw Sets.

Aiken's Genuine.....$13.00, dis 50 &10
Morrill Saw Sets No. 1 $15.00; No. 3 and 4 $24.00 .....dis 40 &10

Scales.

Hatch, Counter, No. 171 .....₱ doz $21.00
Hatch, Tea, No. 161.....₱ doz $6.75@7 00
Chatillon's Grocers .....dis 50
Family Turnbulls.....dis 30@30&10
Scale Beams, List of January 12, 1882 dis 50&10

Scrapers.

Adjustable Box Scraper (S. R. & L. Co.) $6.50.....dis 30&10
Box, 1 Handle.....₱ doz $4.00, dis 10
Foot.....dis 50&10

Screw Drivers.

Stanley R. & L. Co.'s Varnished Handles dis 65&10
Stanley R. & L. Co.'s Black Handles.....dis 60&10
Sets Interchangeable.....₱ doz $18.00 dis 25

Screws.

Wood Screws—List Jan 27, 1881.

Flat head iron.....	dis 70
Round head iron.....	dis 65
Flat head brass.....	dis 65
Round head brass.....	dis 60
Flat head bronze	65
Round head bronze.....	60
Machine, flat head, iron.....	dis 55
Machine, round head, iron	50
Bench and hand—	
Bench, iron	25&10
Bench, wood, beech, per dozen $2.25.....	
Bench, wood, hickory.....20 & 10	
Hand. wood.....20&10	
Lag or coach.....dis 66⅔@70	
Coach, patent gimlet point..... 66⅔@66⅔&5	
Bed..... 25&5	
Hand rail, ... 66⅔&10	

Extra 10 off on Soften given

Saw Tools.

Atkins' patent.....₱ doz sets $6 00

Shears.

American (Cast) Iron.....dis 75&10
Pruning .....See Pruning Hooks and Shears
Garnard's Lamp Trimmers.....₱ doz $4.00
Tinners'.....dis 20&2
Seymours List, Dec. 1881..... dis 60 &10&5
Seymours Tailor's Shears.....dis 33⅓

Scroll Saws.

Lester, complete, $10.00..... ...dis 25
Rogers, complete, $4.00. .....dis 25

Sheaves.

Sliding Door R. & E. list Dec 18, 1885... dis 55&2
Sliding Door, Patent Roller.....dis 60&10&2
Sliding Door, Pat'nt Roller, Hatfield's.....dis 70
Sliding Door, Corbin's Anti-Friction Dec. 18, 1885 dis 60&2

Ship Tools.

L. & I. J. White.....dis 20 & 5

Shovels and Tongs.

Iron Head.....50&10&5
Brass Head.....50

Sieves.

Metallic, new list.....dis 60&10
Flour sifters { Victor.....$2 00
{ Hunter.....$2 25
{ Comet.....$1 25

Slates.

School, by case..... dis 50&5@50&10

Spoke Shaves.

Iron.....dis 30
Wood .....dis 30

Spoke Trimmers.

Bonney's.....₱ doz $10.00 dis 50
Stearns'.....₱ doz $9.00 dis 20&10

Spoons.

Basting Spoons ..... dis 70&10
Britannia. .....dis 50
Rogers Bros. .....dis 50&10

Squares.

Steel and iron ..... } dis 70@10&75
Nickel plated..... }
Disston's try square and T bevels ..... dis 45
Winterbottom's try and miter.....dis 30&10

Steelyards.

dis 40&10@50

Stocks and Dies.

Blacksmith's .....dis 35
"Lightning" screw plate .....dis 15

Stone.

Hindostan, No. 1, 6c; Axe, 4½c; Slips 9c
Washita Stone .....No. 1, ₱ lb 20
Turkey Oil Stone.....4 to 3 in.....₱ lb 40c
Turkey Slips.....$1.00@1.50
Washita Slips No 1.....₱ lb 37@38
Washita No 2 stone.....₱ lb 15c
Arkansas Stone 2.00

Stove Boards.

Zinc.....70
Oxidized..... 45

Shovels and Spades.

Ames' list Nov 1 1885..... .....discount 20
Dennis.....5.50
Hussey & Binns, rail road 8.00

Stove Polish.

Joseph Dixon's.....₱ gross $6 00 dis 10
Gem .....₱ gross 4 50 dis 10
Gold medal.....₱ gross 6 00 dis 25
Rising Sun.....₱ gross $5 50 net
Dixon's plumbago ....₱ lb 8c. net

Trowels.

Lothrops' Brick and Plastering.....dis 25
Reed's Brick and Plastering..... .....dis 25
Disston's Brick and Plastering... dis25
Brade's brick..... dis 20

Tacks, Brads, &c.

New List, September 1, 1882. & Supplement Jan-1, 1886.

American iron carpet tacks all kinds dis.72½&10
Steel carpet tacks all kinds.....72½&10
Swedes Iron carpet tacks all kinds ..... 72½&10
Swedes iron tacks.....67½&10
Swedes iron Upholsterers' tacks.....67½&10
Tinned Swedes iron tacks.....67½&10
inned Swedes iron Upholsterers' tacks ....67½&10
American iron cut tacks ..... 70&10
Copper tacks .....33⅓&10
Copper finishing and trunk nails.....33⅓&10
Cigar box nails .....45&10
Finishing nails. .....60&10
Hungarian nails and miners' tacks.....60&10
Gimp and lace tacks.....67½&10
" " " tinned.....67½&10
Trunk and clout nails.....60&10
Tinned trunk and clout nails.....60&10
Basket nails.....60&10
Chair nails .....60&10
Common and patent brads.....60&10
Tinned capped trunk nails.....60&10

Tinware.

Stamped, Japaned & Pieced. list Jan 20. 1887..... .....dis 70&10

Tobacco Cutters.

Enterprise Mfg. Co (Champion).....dis 20&10@30

Traps.

Game, Newhouse.....dis 35
Victor.....60&10
Wood, mouse.....15c ₱ doz holes
Delusion, mouse.....₱ gross $18 00 dis 15

Trammel Lifters.

Wollensak's Patent..... dis 50

Twine.

	BC.	P.
No. 12, Flax Twine, ¼ and ½ lb Balls...	21½c	27c....
No. 18, " " ¼ and ½ "	21½c	27c.....
No. 36, " " ¼ and ½ "	20c	25c.....
2-Ply Hemp, ¼ and ½ lb Balls (Spring Twine)	17	
3-Ply " 1 lb Balls.....	17½c	
3-Ply " 1½ lb Balls	16c	
Cotton Wrapping, 5 Balls to lb.....	15@16c	

Vises.

Solid box.....50&10&5@60
Parker's..... discount 20@25
Prentiss..... " 20 &5@25
Stephen's..... " 25
Saw Filers, Wentworth's .....dis20&10
Saw filers, Stearn's .....3½%&10

Washer Cutters.

Smith's Patent .....₱ doz $12 00, dis 20&10&10
Johnson's.....₱ doz $11 00, dis 33⅓
Penny's.....₱ dos Pol. $14 00; Jap'd. $16 00, dis 55
Appleton's.....₱ doz $16 00, dis 60&10
Bonney's.....dis 30&10

Well Wheels.

8 in., $2.00; 10 in., $2.50; 12 in., $3.25

Wire.

New List Jan. 18. 1884

Brass and Copper.....discount 20
Bright and annealed, Nos. 0 @18 ... dis70&5@72½
" " Nos. 19 @ 26.....dis 72½&@75
" " Nos. 27 @ 36 dis 75@75&10
Coppered Nos. 0 to 18, market list.....dis 65&10@70
Galvanized Nos. 0 to 18 " " dis 60&7½&@65
Tinned market Nos. 0 to 18..... dis 65
Cast steel .....dis 50
Tinned Broom Wire.....dis70@72½
Annealed Fence, Nos. 8 and 9..... dis75
Annealed Grape, Nos. 10 to 14..... dis 75
Stubs Steel Wire regular.....$6 00.@lb dis30

Wrenches.

Coe's genuine. cash in 10 days..... 55 & 3
Girard Standard.....discount 70&10
Agricultural.....discount 75&10
Mechanics' .....dis 55&10 & 3
Bemis & Call's Combination..... 25&10
Donohue's Engeneers'.....25

TINNERS' STOCK.

Tin.

Banca ..... } Market excited
Straits ..... } and advancing.
English ..... } Quotations only
Bar.. ..... } on application.

Spelter.

American, cash. ₱ lb.....

Charcoal Tin Plate.

IC 12x12 225 sheets..... $6 00@6 50
IX 14x20 112 sheets..... 7 25@8 00
IC 10x14 225 sheets.....₱ box 5 75@6 25
IC 20x28 112 sheets..... 12 25@14 00
IX 10x14 225 sheets ..... 7 25@8 00
IX 12x12 225 sheets ..... 7 75@8 25
For each additional X add $1.90@3.00

Coke Tin Plate.

	Best	Ordinary
IC 10x14 } IC 14x20 }	$5 60	

Solder.

Half and Half, in bars warranted } Quotations
No. 1. Refined..... } only
Bingham..... } application.

Zinc.

inc. cask.....6¼
inc. open.....6¾

LEAD.

Pig.....5
Bar. ₱ lb..... 6
Pipe. ₱ lb..... .....5½c. net
Sheet. ₱ lb..... .....6 net
Chilled Shot ₱ bag 25 lbs 1 35

BABBIT METAL.

No. 4..... 6
Allens..... 9½
Excelsior..... 15
W. B. Genuine..... 25

COPPER.

Lake Ingot..... 17
Arizona..... 15¾

IRON AND STEEL.

Flat Bar

1½ to 4 by ⅜ to 1 inch.....1 75
4¼ to 6 by ⅜ to 1 inch.....1 85
1¾ to 6 by 1¼ to 2 inch.....2 15
1¼ &1¾ by ⅜ to ¾.....1 85
1 &1¼ by ¾ to ¾.....1 85
⅝, ¾ and ⅞ by ⅜ to ¾.....2 15

Round and Square.

1 to 1¾ inch.....1 75
2 to 2¾ 1 95
2¾ to 3¼ inches.....2 25
3⅜ to 4 .....2 75
4¼ to 4½ 3 25
4¾ to 5 .....3 45

Oval.

⅜ to 1¼ inch.....2 15
⅝ to ¾ 2 35
½ 2 55
⅝ 2 95

Half Oval and Half Round.

1½ to 3 inch.....2 85
⅜ to 1¼ 2 45
⅝ to ¾ 2 95
½ 3 25
⅝ 4 75

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch.....1 95
1 to 1⅜ by ¼ and 5-16 inch.....2 05
¾ to ⅞ by ½ and 5-16 inch.....2 25
½ to ¾ by ¼ and 5-16 inch.....2 75

Hoops.

1¼ to 4, Nos. 13 to 15.....2 55
1¼ to 2, Nos. 16 to 18.....2 65
1¼ to 2, No. 19.....2 75
1¼ to 2, No. 20.....2 85
1¼ to 2, No. 21.....2 95
1¼ to 2, No. 22.....3 05
15-16, 1 and 1⅛, Nos. 13 to 15.....2 75
15-16, 1 and 1⅛, Nos. 16 to 18.....2 85
1 to 1⅛, 1 and 1⅛, Nos. 19 and 20.....2 95
15-16, 1 and 1⅛, No. 21.....3 05
15-16, 1 and 1⅛, No. 22.....3 25
⅞, Nos. 13 to 15 .....2 95
⅞, Nos. 16 to 18 .....3 05
⅞, Nos. 19 and 20.....3 15
⅞, No. 21 .....3 25
⅞, No. 22.....3 35
13-16, Nos. 13 to 15.....3 25
13-16, Nos. 16 to 18.....3 15
13-16, Nos. 19 and 20.....3 25
13-16, No. 21.....3 35
13-16, No 22.....3 45
¾, Nos. 13 to 15.....3 55
¾, Nos. 16 to 18.....3 25
¾, Nos. 19 and 20.....3 35
¾, No. 21.....3 45
¾, No. 22.....3 55
11-16, Nos. 13 to 15.....3 65
11-16, Nos. 16 to 18.....3 45
11-16, Nos. 19 and 20.....3 55
11-16, No. 21.....3 65
11-16, No. 22.....3 75
11-16, No. 23.....3 85
⅝, Nos. 13 to 15.....3 85
⅝, Nos. 16 to 18.....3 95
⅝, Nos 19 and 20.....3 95
⅝, No. 21.....4 05
⅝, No 22.....4 15
⅝, No 23.....4 25

Light Band

1¼ to 6 by ¼ to 3-16 in.....2 25
1½ to 6 by Nos. 11 and 12.....2 35
1 to 1¾ by ¼ to 3-16 in.....2 35
1 to 1¾ by Nos. 11 and 12.....2 45
⅞ and 13-16 by ¼ to 3-16 in.....2 65
⅞ and 13 16 by Nos. 11 and 12.....2 75
¾ and 11- 6 by ¼ to 3-16 in.....2 95
¾ and 11-16 by Nos. 11 and 12.....3 05
⅝ and 9-16 by ¼ to 3-16 in 3 25
⅝ and 9-16 by Nos. 11 and 12.....3 30
½ by ½ to 3-16 in.....3 50
½ by Nos. 11 and 12.....3 60

Wagon Box Iron.

⅝ inch, beveled edge, by Nos. 11 and 12.....2 75
⅝ inch, " " " 13 and 14.....3 05
¾ inch, " " " 11 and 12.....3 05
¾ inch, " " " 13 and 14.....3 25

Sheet Iron.

No. 10 to 14.....2 45
No. 15 to 17.....2 65
No. 18 to 21.....2 75
No. 22 to 24.....2 85
No. 25 to 26.....2 95
No. 27.....3 05
No. 28 .....3 25

Iron Boiler Plates.

Tank, ¼ inch and heavier.....2 45
C No. 1, " 2 70
C H No. 1, " 2 95
C H Flange, " 3 65
Extra Flange, " 4 05
Solid Fire Box, " 4 95

Steel Boiler Plates—1 4 in. and heavier.

Tank $2 55
Shell $3 05
Flange.....$3 30
Marine Flange.....$3 80
Fire Box.....$4 45

Above includes plates 90 inches wide.
90 to 96 in. wide..... ..... ½c. lb extra.
96 to 100 in. wide.....1 c. "
100 to 104 in. wide.....1½c. "
104 to 116 in. wide.....special.

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON. cts lb

to 2 in. inclusive..... 09
9-16 to ½ in " 09
7-16 to ⅝ and 2¼ to 3 in..... .....10¼
3¼ to 4 in..... 10
⅝ to 11-16 and 4½ 11¼

TRAVELER'S RECISTER.

Standard Time.
Revised March 6th, 1888.

N. Y. C. & St. L. R. R. Co.— 'The Nickel Plate."

EASTWARD.	ARRIVE.	DEPART
Buffalo Passenger	10 40 a m	10 45 a m
Chicago Passenger	9 20 p m	.....
Local Freight	4 40 p m	5 45 a m
WESTWARD.	ARRIVE.	DEPART.
Chicago Passenger	.....	6 30 a m
Fostoria Passenger	4 46 p m	4 51 p m
Local Freight	5 20 p m	5 50 a m

Rocky River Accommodation departs 7:40 a. m.; 1:40 p. m.

Euclid Accommodation departs 6:24 a. m. 12:10 a. m., 5:05 p. m.

All trains daily, except Sunday.

Cleveland & Pittsburg.

	ARRIVE.	DEPART.
New York Express	12 45 p m	7 45 a m
New York Express	6 55 p m	1 40 p m
Alliance & Akron Accom	9 35 a m	3 25 p m
Ravenna Accommodation	8 25 a m	5 00 p m
Night Express	* 5 25 a m	*11 10 p m

*Daily; all other trains daily except Sunday.

Mt. Vernon & Pan Handle Route

C., A. & C. Ry. Co.	ARRIVE.	DEPART.
Akron, Col. & Cin. "Flyer"	5 40 p m	8 10 a m
Akron, Col. & Cin. Night Express	7 30 a m	8 00 p m
Akron & Columbus Exp	12 45 p m	1 40 p m
Akron & Orrville Accom	9 35 a m	3 25 p m

The 8 p. m. train runs daily. Elegant Pullman palace sleeping cars attached. All other trains daily except Sunday.

Erie Railway.
Depot, South Water St. and Viaduct.

	ARRIVE.	DEPART.
N. Y. & Pitts. Express	15 58 a m	*8 25 a m
Fast N. Y. & Pitts. Express	*10 55 a m	*3 00 p m
Mahoning Accommodation		†6 40 a m
Pittsburgh Express	† 6 25 p m	
Youngstown Local	†8 05 a m	
Mahoning div. and Pitts Local		*11 40 a m
Mahoning Val Accom		*4 30 p m
Pittsburgh Express	†1 20 p m	11 10 p m
New York Express	*8 00 p m	

* Daily. † Daily except Sunday. ‡ Daily except Monday.

Lake Shore & Michigan Southern Railroad.

TRAINS GOING EAST.	Arrive from West.	Depart East.
No. 4, Fast Limited Ex	2 55 a m	*2 55 a m
No. 6, N. Y. & Bos. Ex	*1 35 a m	*1 40 a m
No. 8, N. Y. B't'p & At Ex	*8 25 a m	*8 50 a m
No. 26, Elyria Accom	†7 45 a m	
No. 10, Toledo & Sandusky Accommodation	†11 05 a m	
No. 24, Buffalo Accom		*7 00 a m
No. 10, N. Y. & Boston "Flyer,"		*11 50 a m
No. 12, N. Y. & Bos. Ex.	*2 35 p m	*3 00 p m
No. 2, Night Express	†9 40 p m	†10 00 p m
No 26, Conneaut Accom		†4 25 p m
TRAINS GOING WEST.	Arrive from East.	Depart West.
No. 1, Fast Limited Ex	*12 15 a m	*12 15 a m
No. 23, Cleveland Express	*2 15 a m	
No. 3, Chi. Ex. via Sand'y	15 30 a m	†5 45 a m
No. 25, Mich. Ac. via Norw'k		†5 45 a m
No. 21, Toledo Ex. via Norwalk and Sandusky	†12 50 p m	†3 20 p m
No. 5, Fast St. Louis & Chicago Ex. via Sandusky	*10 50 a m	*10 55 a m
No. 9, Chi. Pac. Ex. via Nor'k	*6 55 p m	*7 15 p m
No. 31, Elyria Accommodation, to Elyria only		†4 30 p m
No. 27, Conneaut Accom	†8 10 a m	

Sunday train for Nottingham— Depart 8:15 a. m. and 1:00 p. m.; arrive 9:20 a. m. and 4:45 p. m.

Reference marks—*Daily. †Daily except Sunday. ‡Daily except Monday.

A local Cleveland and New York Sleeper and dining car daily on No. 10, leaving Cleveland at 11:50 a. m., arrives Grand Central Depot, New York 7:30 a. m.

For further information as to trains, connections and sleeping car berths apply at the City Ticket Office 259 Bank St., Mercantile Bank building. Telephone 669.

M. E. GAUL, City Pass. Ag't. A. J. SMITH, Gen'l Pass. & Ticket Ag't.

Cleveland and Canton Railroad.

Arrive.—Canton, Sherrodsville and Coshocton 9 55 a.m., 7 00 p.m.

Kent —*7 50 a.m., *7 16 p.m.

Bedford—*7:50 a.m., 1:05 p.m., 7 16 p.m.

Newburgh and Miles avenue—7:10 a.m., 4:15, p.m. 5:33 p.m.

Depart—

Canton, Sher'dsville & Cosh't'n—7:00 a.m. and 3:10 p.m.

Kent—*8:38 a.m. and *8:30 p.m.

Bedford—*8:38 a.m., 4:45 p.m., 11:10 a.m., 5:45 p.m.

Newburgh and Miles Avenue—6:12 a.m., 2:00 p.m., 4:40 p.m.

Trains marked with * run daily. All others daily except Sunday.

Depot at Ontario street, one block north of Huron street

Cleveland, Lorain and Wheeling.

	DEPART.	ARRIVE.
Wheeling Express	6 45 p m	6 55 p m
Uhrichsville Express	4 00 p m	9 20 a m

Pittsburgh & Lake Erie Railroad.

On and after Jan. 2, 1888, passenger trains will depart from and arrive at the Pittsburgh and Lake Erie Depot at Pittsburgh, as follows, Central time:

P. & L. E. R. R. Depart for—

No. 1, Cleveland, Bradford and East..... 5 25 a.m
No. 5, Buffalo, St. Louis, Cleveland..... 7 45 a.m
No. 5, Beaver Falls Accommodation..... 8 40 a.m
No. 7, Buffalo, New York, and all New England points..... 10 15 a.m
No. 9, Chicago, Cincinnati, St. Louis,... 1 10 p.m
No. 11, Buffalo Express..... 3 30 p.m
No. 13, Beaver Falls Accommodation..... 5 20 p.m
No. 15, Buffalo Express..... 10 30 p.m

Arrive from—

No. 2 Beaver Falls Accommodation..... 5 25 a.m
No. 4, Buffalo and Cleveland Night Exp. 6 55 a.m
No. 6, Youngstown Accommodation..... 9 20 a.m
No 8 Beaver Falls Accommodation..... 12 40 p.m
No. 10, Chicago, Cincinnati & St. Louis, 1 35 p.m
No. 12, Buffalo Express..... 5 45 p.m
No. 14, Cincin., St Louis and Cleveland, 8 05 p.m
No. 14, Cleveland & Buffalo Express..... 10 35 p.m

Pittsburgh & Lake Erie trains Nos. 4, 15, 8 and 10 daily.

E. HOLBROOK, General Superintendent.
R. W. JONES, Master of Transportation.
A. D. SMITH, Gen'l Pass, Ag't, Pittsburgh.

WHEELING & LAKE ERIE

TIME TABLE—IN EFFECT JAN. 8, 1888, Central Standard Time.

EASTWARD.	No. 5.	No. 7.	No. 9.*	No 13*
Toledo.....lv	7 45 AM	1 10 PM	4 50 PM	7 45 PM
Oak Harbor...ar	8 41	2 05	5 45	10 01
Fremont	9 06	2 30	6 10	10 45
Clyde	9 22	2 47	6 25	11 15
Bellevue	9 37	3 03	6 40	11 40 PM
Monroeville..lv	9 55	3 20	6 58	3 10 AM
Norwalk	10 10	3 40	7 15	3 22
Wellington	11 00	4 32	8 08	4 00
Creston	11 53	5 20	9 05 PM	4 47
Orrville.....ar	12 20 PM	5 48	9 40 PM	5 15*
Orrville.....lv	12 40	6 53	7 05 AM	7 05
Massillon.....ar	1 20	6 35	7 52	7 52
Massillon.....lv	1 20	6 35	7 52	7 52
Navarre	1 35	6 50	8 10	8 10
Valley Junc.lv.	2 20	7 35	8 55	8 55
New Cumberl'd	2 23	7 48	9 10	9 10
Sherrodsville	2 45	8 00	9 25	9 25
Leesville	2 52	8 08	9 40	9 40
Bowerston.....ar	2 58PM	8 15PM	9 50AM	9 50AM
Canal Dover	2 57 PM			
New Comerst'n	3 18			
Cambridge	4 35			
Macksburg	6 02			
Marietta.....ar	7 15 PM			

WESTWARD.	No. 6.	No. 8.	No. 4.	No. 2.*
Marietta.....lv	6 45 AM	2 20 PM		
Macksburg	7 56	1 30		
Cambridge	9 23	3 00		
New Comerst'n	10 23	3 58		
Canal Dover	11 04 AM	4 33PM		
Bowerston	11 25 AM	3 45PM	5 55 AM	
Leesville	11 32	3 55	6 02	
Sherrodsville	11 40	4 10	6 10	
New Cumberl'd	11 52	4 25	6 22	
Valley Junc	12 20 PM	5 02	6 45	
Navarre	12 50	5 35	7 35	
Massillon	1 05	5 50	8 00	
Orrville.....ar	1 40	6 25	8 55	
Orrville.....lv	1 45	6 35*	9 13	
Creston	2 18	7 02	9 42	
Wellington	3 06	7 43	10 33	
Norwalk	3 55	8 25	11 30	7 25 AM
Monroeville	4 07	8 35	11 45	7 35
Bellevue	4 23	9 45	11 59	7 51
Clyde	4 39	10 00	12 15 PM	8 06
Fremont	4 55	10 17	12 30	8 23
Oak Harbor	5 20		12 53	8 45
Toledo.....ar	6 20 PM	11 15*	1 50 PM	9 40 AM

No. 27	No. 25	Huron Divis'n.	No. 26	No. 28
4 50 PM	7 40AM	Ar.. Huron ..Lv	8 55 AM	5 30PM
4 32	7 22	Friese Landing	9 10	5 45
4 20	7 10	.....Milan	9 28	6 03
Lv 3 55	Lv 6 45	.....Norwalk.....	Ar 9 55	Ar 6 30
Ar PM	Ar AM		Lv AM	Lv AM
		Monroeville		

* Daily.

Train No. 13 leaves Toledo *7 45 p. m.; arrive Monroeville 12 15 a. m. and Norwalk 12 35 a. m

This road is now open through from Toledo to Bowerston, connecting with the Pennsylvania System for all points East.

THROUGH CAR SERVICE.

Between Toledo, Cambridge and Marietta.
" " and Bowerston.
" " and Akron, Youngstown and Pittsburgh.
" Chicago, Akron, Youngstown and Pittsburgh.

M. D. WOODFORD, Gen'l Manager. JAMES M. HALL, Gen'l Pass. Agt.

Scioto Valley Railway

TIME TABLE.
In effect May 27, 1888.
THE SHORT LINE TO ALL POINTS
North and South, East and Southeast, West and Northwest.

TRAINS GOING SOUTH.

STATIONS.	No. 2.	No. 4.	No. 6.
Columbus.....Lv	7 10 a.m	11 25 a.m	5 25 p.m
Valley Crossing	7 30 "	11 44 "	5 45 "
Lockbourne	7 41 "	11 53 "	5 56 "
Ashville	7 55 "	12 07 p.m	6 10 "
Circleville	8 15 "	12 26 "	6 30 "
Kingston	8 34 "	12 44 "	6 49 "
Chillicothe	9 01 "	1 30 "	7 35 "
Sharon	9 36 "	2 05 "	8 10 "
Waverly	9 46 "	2 14 "	8 20 "
Piketon	9 58 "	2 27 "	8 33 "
Big Run	10 12 "	2 41 "	8 47 "
Lucasville	10 27 "	2 57 "	9 03 "
Portsmouth	10 50 "	3 20 "	9 25 "
Sciotoville	11 05 "	3 35 "	9 40 "
Wheelersburg	11 10 "	3 40 "	9 45 "
Havernill	11 29 "	3 59 "	10 04 "
Hanging Rock	11 40 "	4 10 "	10 15 "
Ironton	11 50 "	4 20 "	10 25 "
Petersburg	12 00 m.	4 30 "	10 35 "
Ashland.....Ar	12 30 p.m	5 00 p.m	11 05 p.m

Trains Nos. 2 and 4 daily, except Sunday.
Train No. 6 daily.
Train No. 6 takes supper at Chillicothe.

TRAINS GOING NORTH.

STATIONS.	No. 1.	No. 3.	No. 5.
Ashland.....Lv	2 46 a.m	9 05 a.m	5 35 p.m
Petersburg	3 15 "	9 35 "	6 05 "
Ironton	3 26 "	9 46 "	6 15 "
Hanging Rock	3 36 "	9 56 "	6 25 "
Havernill	3 46 "	10 07 "	6 36 "
Wheelersburg	4 06 "	10 28 "	6 55 "
Sciotoville	4 12 "	10 33 "	7 00 "
Portsmouth	4 27 "	10 05 "	7 15 "
Lucasville	4 49 "	11 14 "	7 37 "
Big Run	5 04 "	11 32 "	7 53 "
Piketon	5 18 "	11 48 "	8 07 "
Waverly	5 30 "	12 01 p.m	8 20 "
Sharon	5 40 "	12 11 "	8 30 "
Chillicothe	6 35 "	1 10 "	9 06 "
Kingston	7 01 "	1 26 "	9 31 "
Circleville	7 20 "	1 36 "	9 49 "
Ashville	7 40 "	1 55 "	10 08 "
Lockbourne	7 55 "	2 15 "	10 22 "
Valley Crossing	8 06 "	2 39 "	10 31 "
Columbus.....Ar	8 30 a.m	3 00 p.m	10 50 p.m

Train No. 1 daily.
Trains Nos. 3 and 5 daily, except Sunday.

COUPON TICKETS, by the best routes and to all principal points in the United States and Canada, can be found at the following Stations: Columbus, Circleville, Kingston, Chillicothe Waverly, Portsmouth, Ironton, A. C. & I. Ashland.

For further information relative to rates, connections and through time, call on your Ticket Agent, or address J. ROBINSON, Receiver.
JNO. J. ARCHER, Gen'l Pass. & Ticket Ag't, Columbus, Ohio.

Ft. Wayne, Cincinnati & Louisville

RAILROAD.
THE POPULAR ROUTE
BETWEEN THE
NORTH and SOUTH

THE DIRECT ROUTE TO OR FROM
FORT WAYNE,
INDIANAPOLIS,
TERRE HAUTE,
EVANSVILLE,
AND ST. LOUIS.

13 MILES SHORTER 13
—BETWEEN—
Fort Wayne and Indianapolis
Than any other Route.

22 MILES SHORTER 22
AND QUICKER
By **3 HOURS**, Between
Louisville and Fort Wayne.

Ask for Tickets
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Ft. Wayne, Cincinnati & Louisville Railroad.

For sale by all Agents of connecting lines, EAST, WEST, NORTH AND SOUTH.

W. W. WORTHINGTON, Gen'l Supt. S. A. WIKEL, Gen'l Ticket Agent, FORT WAYNE, IND.

The Picturesque Lehigh Valley Route.

Two through trains with Pullman cars attached are now run via by this beautiful scenic route, between Suspension Bridge, Buffalo, New York and Philadelphia, leaving Suspension Bridge 8:35 A. M. and 3:40 P. M., Buffalo 9:15 A. M. and 5:15 P. M., connecting with all trains from the West.

Passengers between the East and West passing over the famed LEHIGH VALLEY ROAD will experience the pleasure of a trip through the most magnificent and picturesque scenery in the world, presenting an ever varying panorama of delightful surprises.

Double track, steel rails, magnificent road bed and unrivaled equipment, all combine to make the LEHIGH VALLEY the favorite and most desirable route between the East and the West.

Anthracite Coal is used entirely, guaranteeing the passengers perfect freedom from the dense volumes of smoke that so greatly annoy passengers on lines using Bituminous Coal.

E. B. BYINGTON, Gen'l Pass. Agent Bethlehem, Pa.

Expiration Registers.

MANUFACTURERS' and Dealers' Insurance Registers with special ruling for number of Policy, Company, seven spaces for amounts on different property, amount of policy, amount of premiums, time of expiration, etc., will be sent post-paid on receipt of $1.00. Or we will give one as a premium with each new subscription to the IRON TRADE REVIEW, price $3.00 per year.

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Cleveland, Ohio.

Detroit & Cleveland

STEAM NAVIGATION CO.

Week Days **FOR DETROIT** 9.00 P. M.

Special Sunday Night and Thursday Morning Trips, July and August.

Four Trips **For Mackinac** per Week,

and Lake Huron Way ports.

All Departures from 23 River Street.

E. B. WHITCOMB, G. P. A. T. F. NEWMAN, G. A

VALLEY RAILWAY.

Depot foot South Water Street.

	Arrive.	Depart.
Valley Junction Mail	*7 30 a m	*9 55 a m
Through Marietta Ex	†11 20 a m	†2 30 p m
Akron Accommodation	† 2 30 a m	†5 45 p m
Canal Dover Express	* 4 30 p m	*8 15 p m
Akron Accommodation	* 7 45 p m	*7 45 a m

*Daily.
†Daily, except Sunday.

WM. THORNBURGH, Gen. Manager, R. A. CARRAN, Gen. Pass. Ag't.

ERIE RAILWAY.

THE FAVORITE
AND
Picturesque Route
TO
New York, Boston and the East.

THE SHORTEST AND QUICKEST ROUTE TO PITTSBURGH, WASHINGTON AND BALTIMORE, AND THE SOUTHEAST.

Change of time goes into effect May 20, 1888.

Central, or Ninetieth Meridian time, 33 minutes slower than Cleveland city time.

Until further notice trains will leave from the New Central Depot, South Water Street and Viaduct, as follows:

	Depart.
No. 62, Mahoning Valley Accommo	† 6 40 a m
No. 72, New York Express	* 8 30 a m
No. 72, Fast Pittsburgh Express	* 8 30 a m
No. 64, Fast New York Express	* 3 00 p m
No. 64, Pittsburgh Express	* 3 00 p m
No. 66, Youngstown Accommo	* 5 00 p m
No. 68, Pittsburgh Express	†11 10 p m
No. 68, New York Express	†11 10 p m
No. 70, Pittsburgh Local Express	*11 40 a m
No. 74, Shenango Valley Express	† 4 00 p m
	Arrive.
No. 73, Shenango Valley Express	† 9 23 a m
No. 61, New York Express	† 5 45 a m
No. 61, Pittsburgh Express	† 5 45 a m
No. 65, Fast New York Express	*10 55 a m
No. 65, Pittsburgh Express	*10 55 a m
No. 67, Pittsburgh Express	† 1 20 p m
No. 63, New York Express	* 7 05 p m
No. 69, Pittsburgh Express	* 8 40 p m
No. 77, Youngstown Local	* 7 25 a m
No. 13, Erie Express, carrying express matter only, from all points East and South-east, carries no passengers (except Monday)	† 1 20 p m

* Daily. † Daily, except Sunday.

☞ This is the only route by which passengers can reach Corry, Elmira, Binghampton, New York City and intermediate points without change. No change to Boston and New England cities.

Baggage checked through to all points East.

Through tickets and information regarding the route can be obtained at office, 141 Superior street, and at Central Depot, South Water street and Viaduct, Cleveland. Ship by Erie Express.

E. B. THOMAS, 2d Vice President, Cleveland, O.
L. P. FARMER, Gen'l Pass. Agent, New York.
W. C. RINEARSON, Ass't G. P. A., Cincinnati, O
M. L. FOUTS, City Passenger Agent, 141 Superior Street, Weddell House, Cleveland, O.

Cleveland & Marietta R. R.

THROUGH LINE BETWEEN

Marietta, Caldwell, Cambridge, Newcomerstown, Canal Dover, Canton, Akron, Cleveland, Buffalo, Toledo Pittsburgh, New York, Coshocton, Newark, Zanesville, Columbus, Chicago and St. Louis.

In effect April 22d, 1888.

GOING NORTH.			GOING SOUTH.	
No. 4.	No. 2.	STATIONS.	No. 1.	No. 3.
9 55 AM	2 00 AM	..Parkersburg	2 45 PM	11 55 AM
12 20 PM	6 45	.....Marietta	10 15 AM	7 13
12 40	7 05	.....Caywood	9 55	6 53
12 46	7 11	..... Stanley	9 49	6 47
1 00	7 25	.....Whipple	9 35	6 32
1 10	7 35	.....Warner	9 25	6 22
1 23	7 48	.....Elba	9 12	6 09
1 30	7 55	... Macksburg	9 05	6 02
1 37	8 01	...Dexter City	8 58	5 55
1 41	8 05	...South Olive	8 54	5 50
1 48	8 12	.....Dudley	8 47	5 43
1 57	8 20	.....Caldwell	8 40	5 36
2 07	8 30	..Belle Valley	8 30	5 26
2 17	8 40	..... Ava	8 19	5 16
2 29	8 52	..Pt. Pleasant	8 07	5 04
2 42	9 04	.....Byesville	7 53	4 50
3 00	9 25	...Cambridge	7 36	4 35
3 07	9 32	.....Oldham's	7 27	4 27
3 14	9 40	.....Miller's	7 20	4 20
3 24	9 50	...Kimbolton	7 10	4 10
3 39	10 05	.....Guernsey	6 56	3 55
3 47	10 12	.....Post Boy	6 49	3 47
3 58	10 23	N. Comerstown	6 40	3 38
4 05	10 30	..... Wolf's	6 31	3 29
4 17	10 43	..Phillipsburg	6 20	3 17
4 22	10 48	..Black Band	6 14	3 12
4 28	10 54	....Turner's	6 09	3 06
4 38	11 04	..Canal Dover	6 00 AM	2 57
5 00	11 27	ar. Vall'yJ'n. lv		2 35
5 02	11 35	lv. Vall'yJ'n. ar		2 20
	12 19 PM	.....Canton.....		1 30
	1 12	..... Akron.....		12 31
	2 36	... Cleveland.....		11 20
	8 00	.....Buffalo		5 40
11 15 PM	6 20	.....Toledo.....		7 05

Train No. 8 leaves Marietta at 1 40 p. m. Whipple 2 40, Warner 3 00, Elba 3 20, Macksburg 3 35, Dexter City 3 47, Caldwell 4 25, arriving Cambridge 6 30 p. m. Train No. 5 leaves Valley Junction at 5 13 p. m., arriving at Canal Dover 5 35 p. m.

Through coaches on trains Nos. 2 and 3 between Marietta, Canton, Akron, Cleveland and Toledo. Close connections made at Marietta with C., W. & B., M., C. & N., Z. & O., and Ohio River Packets; at Cambridge with B. & O., east and west; at Newcomerstown with P., C. & St. L. east and West; at Canal Dover with C., L. & W and C. & P., north and east; at Valley Junction with W. & L. E. and Valley R'y.

W. K. RICHARDS, Gen. Pass. Agt
A. T. WICKOFF, Gen. Manager.

½ to 6 in.	11¼
¼ to 9-32 and 6⅛ to 7 in.	12
3-6 in.	14

Flats.

	cts. lb
2 to 9-16 wide by 2 to ⅝ thick	0

Bessemer and O. H. Steel.

	cts. lb.
Machinery base price.	02½
Tire "	02½
Spring "	03¼
Sleigh Shoe "	02¾
Toe Calk "	03
Cutter Shoes, tapered and burr "	03

For extra sizes, see classification below.

Machinery Steel.

ROUNDS AND SQUARES.

	cts. per lb ex.
1 to 3 in. incl.	base
3⅛ to 4 "	0.3
4⅛ to 6 "	1.0
¾ to 15-16 "	0.2
⅛ to 11-16 "	0.3
⅝ to 7-16 "	0.4
5-16 to 11-32 "	0.5
¼ and 9-32 "	0.7
Machine cutting, specified lengths, ab'e 24 in.	0.2
Machine cutting, specified lengths, 12 to 24 in.	0.4

Machine cutting to specified lengths less than 12 inches, according to contract, but not less than 0.6 cents on each size extra. Sawing, one-half of the above extra for cutting.

FLATS.

	cts. per lb ex.
1¼ to 6 in., by 5-16 to 1 in. thick	base
1¼ to 6 in., by ¼ and 9 32 in. thick	0.2
1¼ to 6 in., by 3-16 and 7-32 in. thick	0.3
1¼ to 6 in., by ⅛ and 5-32 in. thick	0.4
¾ to 1 7-19 in., by ¼ to 1 in. thick	0.3
½ to 1 7-16 in., by 3-16 and 7-32 in. thick	0.4
½ to 1 7-16 in., by ⅛ and 5 32 in. thick	0.5
⅝ to 11-16 in., by ¼ to ½ in. thick	0.4
⅝ to 11-16 in., by 3-16 and 7-32 in. thick	0.6
⅝ to 11-16 in., by ⅛ and 5-32 in. thick	0.8
⅝ to ¾ in., by 1-16 and 3-22 in. thick	2.0
13-16 to 1¼ in., by 1.16 and 3-32 in. thick	1.5
1¼ to 3 in., by 1-16 and 3-32 in. thick	1.0

These extras apply on Tire, Toe-Calk, Shoe and Flat Machinery Steel, also on Cutter Shoes.

SPRING STEEL FLATS.

	cts. ex.
1¼ to 4 in. by No. 4 gauge to ⅛ in. inclusive,	base
1 and 1⅛ in. by No. 1 gauge to 4 gauge "	0.2
1 to 3 in. by No. 5 gauge to 7 gauge "	0.5
⅞ to 3 in. by No. 8 gauge to 10 gauge "	1.0
¾ to 3 in. by No. 11 gauge to 16 gauge "	2.0
¾ to 3 in. by No. 17 gauge to 20 gauge "	3.5
⅝ to ⅝ in. by No. 10 gauge to 16 gauge "	4.0
⅝ to ⅝ in. by No. 17 gauge to 20 gauge "	5.0
⅝ to ⅝ in. by No. 21 gauge to 24 gauge "	6.0

Bessemer and Open Hearth cut to length, 24 inch and over 1-10 cent per lb. extra, and under, by special contract.

ROUND SPRING STEEL.

	cts. ex
⅝ to 1½ inches	base
¼ to 9-16 inches	0.2
⅜ to 7-16 inches	0.5
5-16 inches	1.0
¼ inches	1.5

English Tool Steel.

Jessops	16c
Hob on's "Best"	16c
" "Choice"	36c

Burden Boiler Rivets.

½, ⅝, 11-16 and ¾ inches diameter	4 00
Bridge ½, ⅝, 11-16 and ¾ inch diam	4 00

Rolls and Castings.

Furnace floor and straightening plates	1¼c
Housings and castings not otherwise specified	1¾c
Guide plates	2½c
Spindles and coupling boxes	1¾c
Sand rolls and pinions, large size	2 c
Sand rolls and pinions, small size	2¼c
Pipe mill castings	3 c
Rolling mill castings under 50 lb	2 c
Spur and bevel wheels, large	3 c
Spur and bevel wheels, small	3¼c
Pulleys up to 30 inches	4 c
Pulleys over 30 inches	3½c
Engine castings, light	3¼c
Engine castings, heavy	2¾c

SCRAP IRON AND OLD METAL

	Net Ton.
No. 1 R. R. wrought scrap	$23 00
No. 1 wrought scrap	20 00
No. 1 Machine cast scrap	15 00
Stove plate (free from burnt iron)	10 50
Grate bars	11 00
Pipes and flues (Clean)	13 00
Tank iron	12 50
Hoop and band iron	10 00
Iron axles	28 00
Light sheet iron	10 00
Axle turnings	16 00
Wrought turning (free from cast)	15 00
Wrought iron, oily drillings	14 00
Cast borings	11 00
Malleable iron	10 50
Uncut wrought iron boilers	10 00
Steel boiler plates	14 50
Old iron T rails gross tons	$27 00
Old steel rails	23 00
Car wheels	20 00
Old copper per lb	7
No. 1. H. red Brass	8½
Heavy yellow brass	6¼
Light yellow Brass	6
Scrap Zinc	3
Tea Lead	3
Heavy Lead	3¼

WROUGHT IRON PIPE.

DISCOUNTS.

	Discount Per Ct.
Wrought iron pipe: Butt black X str	
XX str	55
Wrought iron pipe: Lap black X str	
XX str	55
Wrought iron pipe: Butt galv	45
" Lap "	55
Lap-welded boiler tubes	50
" drive pipe	
" casing	
Lead pipe per lb	
Sheet lead "	
Galvanized spiral pipe	50
" " fittings	30
Patent adjustable ells	40
Globe ventilators	60
Tin tubing	50
Fittings for same	30
Expanding conductor pipe and fittings	40
Cast iron piece fittings for wrought iron pipe, black and galv	70
Bushings and plugs	75

Malleable unions	65
" flange unions	72½
Long screw	70
Gas pipe hooks	50
Cast iron flanges, manifolds and expansion pipe hangers	65
Hook, ring and expansion plates, coil stands	67½
Iron body: Globe, angle, check, cross, safety, butterfly, throttle, back pressure and foot valves	65&10
Iron body: Expansion joints and iron cocks, all iron	65&10
Iron body: Iron cocks with brass plugs	60&10
Straight way valves	
Brass: Globe, angle, check, cross safety, and radiator valves	60&10
Throttle and butterfly valves	50&10
Brass: Fin. globe valves, with finished brass wheels	40&10
Brass: Steam, service, meter and union meter cocks	57½&10
Brass: Expansion joints and steam bibbs	50&10
Mississippi gauge cocks	55
Bingham "	
Gas proving pumps	50
Oil cups, lubricators and air cocks	60&10
Cocks for steam gauges	60&10
Cylinder cocks	50&10
Comp. gauge cocks	55&10
Water gauges, steam whistles and whistle valves	60&10
Gas fixture fittings	50
McNamara hydrants and street washers	Spec'l
Stop cock boxes	Spec'l
Galvanized wrought iron range boilers, to 52 gallons	65
Galvanized wrought iron range boilers, larger	50
Stands for same	40
Copper bath tubs	25
Closets	Spec'l
Cast iron soil pipe, to 6 in. inclusive	60
" " fittings, to 6 in. inclusive	65
Cast iron sinks	70
" slop sinks	60
Drive-well points	50
Ground key work:	
Rough and fin. plain, tray and bath bibbs } " " stops, shower stops, hydrant and ball cocks }	55&10
Compression:	
Rough and fin. plain, tray and bath bibbs	50&10
" " stops; urinal, hopper, hydrant and ball cocks	50&10
Basin cocks, from No. 1 to 13 inclusive	50&10
" " above No. 13, and double basin	40&10
Shampooing and sink cocks	40&10
Pantry cocks	50&10
Shampooing sprinklers	50&10
Double bath cocks and chain stays	50&10
Hose goods, plain and water back couplings	55&10
Boiler couplings, ground face, per set net, $1.25	10
Boiler couplings plain face, per set net, $1.20	10
Basin plugs and grates; bath, sink and wash tray plugs	60&10
Soldering nipples and unions	65&10
Union joints	60&10
End ferrules; street washer screws, checks and guides	55&10
Hydrant and basin clamps, hydrant sockets	55&10
Pipe taps, reamers and dies	60
Plain pipe tongs and gas plyers	50
Wrenches: Coe	50 & 5
" Girard agricultural	65
" " standard	60 & 5
" Stillson	33⅓
" Armstrong	25 & 5
" Bemis & Call	25 & 5
" Rouse	30
" Bauer's	10
Pipe tongs: Brown's adjustable	50
" Jarecki	50
" Robbins' chain	10
" Brock's	10
Vises: Plain pipe	55
" Smith comb	50
" Parker's comb	50
" Bauer's pipe and bolt	10
Machinists' hammers	40
Copper "	Spec'l
Pipe cutters: Stanwood	20
" Eureka	45
" Saunders	40
" Barnes	50 & 5
Malleable oilers and hand lamps	Spec'l
Screwing stocks	60
Armstrong's adjusable stocks and dies	25&10
Waste, at manufacturer's prices.	
Gas fitters' cement	Spec'l
Hair felt	Spec'l
Riley Bros. cement	Spec'l
Otley Bros. steam packing	Spec'l
Mineral wool	Spec'l
Lubricating compound	Spec'l
Malleable iron fittings, black and galv	25
Wrought iron couplings and nipples, black and galv	70

Standard Wrought Iron, Steam, Gas and Water Pipe.

Nominal Size Inside Diameter.	Price per Foot, Black.	Price per Foot, Galvanized.	Thickness.	Nominal Weight per Foot.	No. of Threads per In. of Screw.	Price, Extra Threads.
In.			In.	Lbs.		
⅛	0 04	0 05	.068	0 24	27	0 05
¼	0 04	0 05	.088	0 42	18	0 05
⅜	0 04	0 05½	.091	0 56	18	0 05
½	0 05	0 07	.109	0 84	14	0 05
¾	0 07	0 09	.113	1 12	14	0 05
1	0 09½	0 12½	.134	1 67	11½	0 06
1¼	0 12½	0 17	.140	2 24	11½	0 07
1½	0 22	0 25	.145	2 68	11½	0 08
2	0 28	0 32	.154	3 61	11½	0 10
2½	0 44	0 49	.204	5 74	8	0 15
3	0 58	0 64	.217	7 54	8	0 20
3½	0 70	0 86	.226	9 00	8	0 25
4	0 85	1 00	.237	10 66	8	0 35
4½	1 00	1 25	.246	12 49	8	0 45
5	1 20	1 50	.259	14 50	8	0 55
6	1 65	2 00	.280	18 76	8	0 70
7	2 00		.301	23 27	8	0 85
8	2 75		.322	28 18	8	1 00
9	3 70		.344	33 70	8	1 20
10	4 75		.366	40 06	8	1 25
11	5 75		.375	45 02	8	1 50
12	6 50		.375	49 00	8	2 50
13	7 75		.375	54 00	8	
14	9 00		.375	58 00	8	
15	10 00		.375	62 00	8	

Extra Strong, double above list.

Double Extra Strong, double list of Extra Strong.

LAP-WELDED BOILER TUBES.

Size, Outside Diameter, inches	J	1⅛	1¼	1½	1¾	2	2¼	2½	2¾	3	3¼	3½	3¾	4	4½	5	5	6	7	8	9	10	11	12
Price per foot	23/8	23	23	23	24	22	25	28	31	34	38	43	45	52	60	72	1 00	1 45	1 85	2 25	2 75	3 25	3 75	4 50
Price, Lap-Welded Drive Pipe		10	12		15					30		40		50	60	66	90	1 20	1 66	2 20	3 00			

DRIVE PIPE SHOES.

	6"	8"	10"	12"
Long, Separate	13 00	15 00	20 00	25 00
" Shrunk on pipe	16 00	18 00	25 00	30 00
Short, Separate	12 00	14 00	17 00	22 00
" Screwed on pipe	13 00	15 00	19 00	24 00

DRIVE PIPE HEADS.

	12 00	15 00	18 00	22 00

LAP-WELDED CASING.

Size, Inside Diameter Nominal	2	2¼	2½	2¾	3	3¼	3½	3¾	4	4¼	4½	4¾	5	5 3-16	5½	6	6¼	6½	7	7½	8	8½	9
Price, per foot	25	28	31	34	38	43	45	52	56	61	66	72	79	86	1 00	1 30	1 45	1 85	2 10	2 25	2 75	3 25	3 75

Tarred or Asphalt and Kalamein Pipe, list and discount furnished on application.

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And get the genuine article, and save liability of suit for using an article made in violation of the patents issued to Wm. Green and now owned by this Company.

IRON CLAD PAINT is the most durable, most fireproof and Cheapest Paint made.

FURNISHED both Dry and Ground in Oil.

Used by Nearly all the Railroads. 63

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REPOSITORIES: Des Moines, Ia. Minneapolis, Minn. Kansas City., Mo.

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Castings

For Machinery and Rolling Mills

Car Wheels

all sizes and kinds, with and without Axles.

Chilled Faced R. R. Frogs

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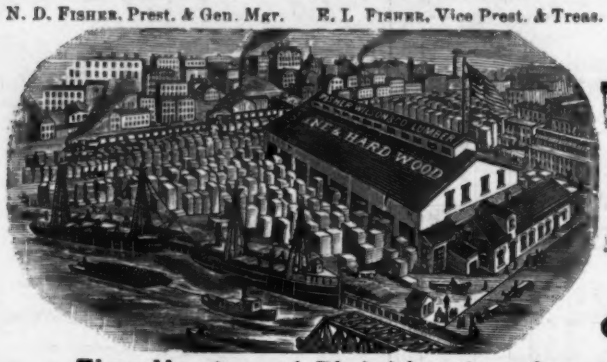
N. D. FISHER, Prest. & Gen. Mgr. E. L. FISHER, Vice Prest. & Treas. A. M. ALLYN, Sec.



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PLAIN OAK, QUARTERED OAK ASH, CHERRY, WALNUT, YELLOW POPLAR, HICKORY, RED BIRCH, ROCK MAPLE, BIRD'S EYE MAPLE, WHITE MAPLE, BEECH, ELM, SOUTHERN PINE.
Bridge and Car Timber Cut to Order. 42

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CLEVELAND, O.,
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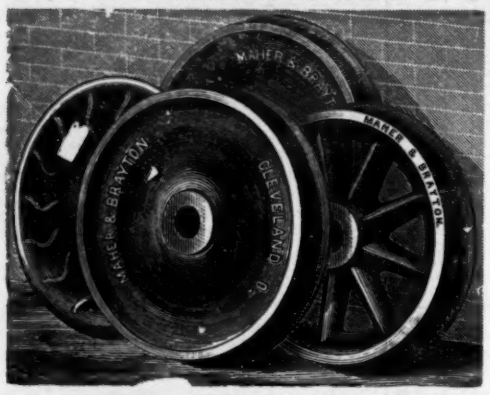

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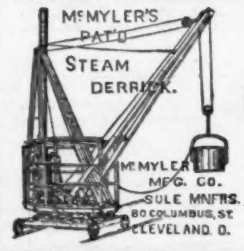

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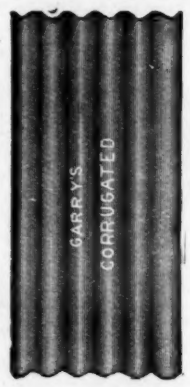

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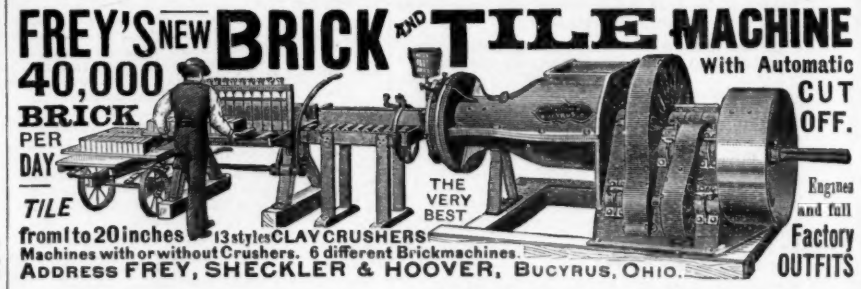

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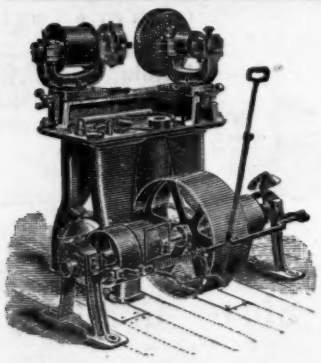

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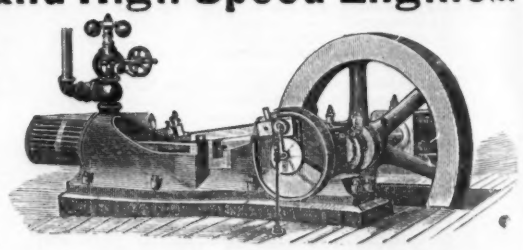

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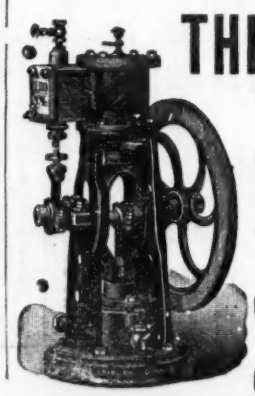

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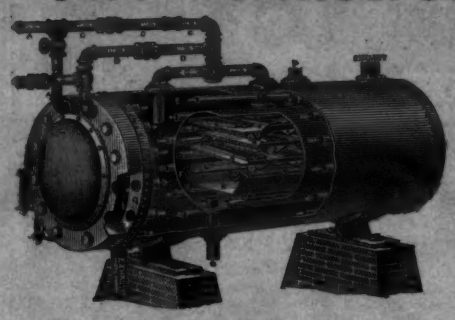

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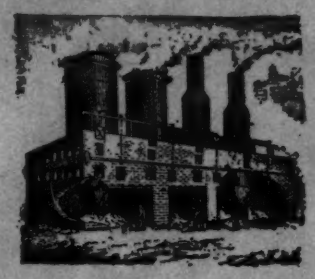

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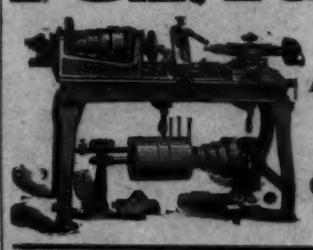

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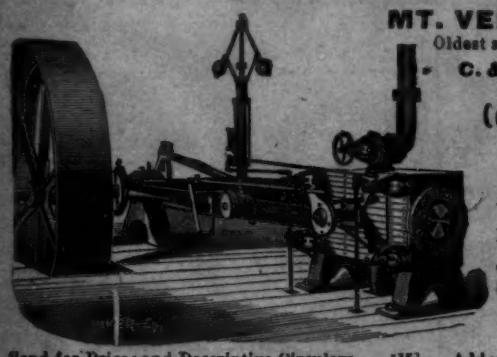

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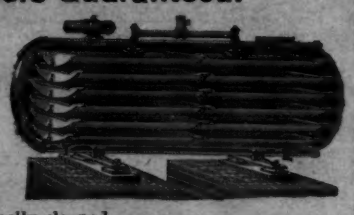

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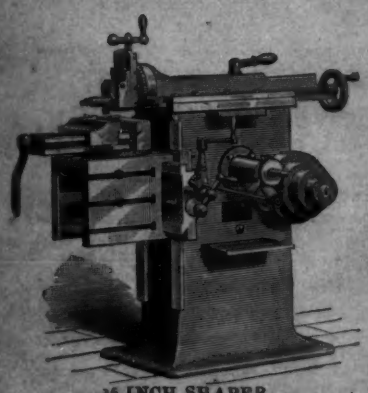

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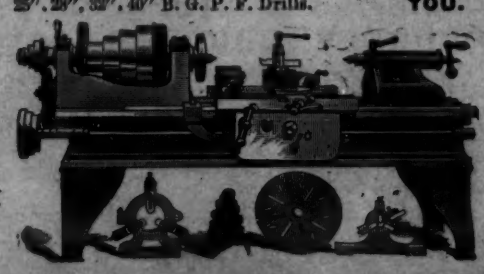

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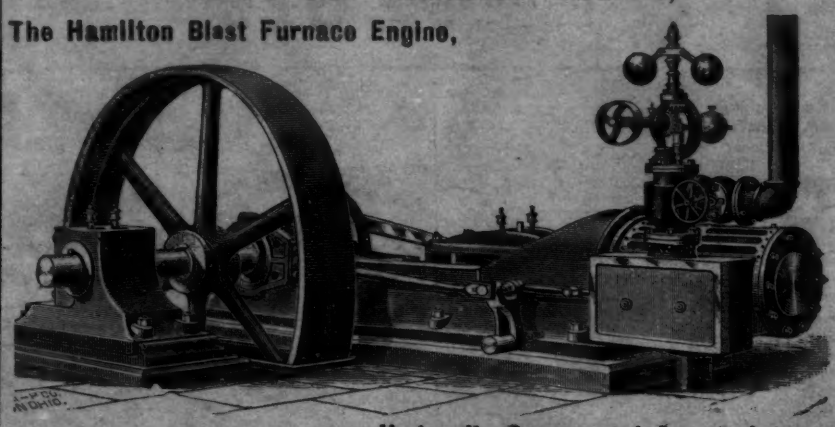

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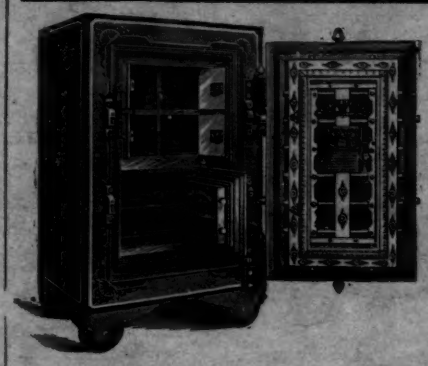

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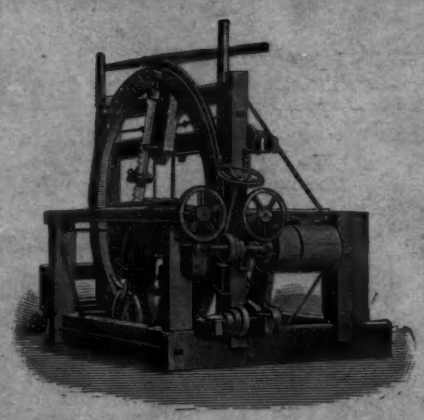

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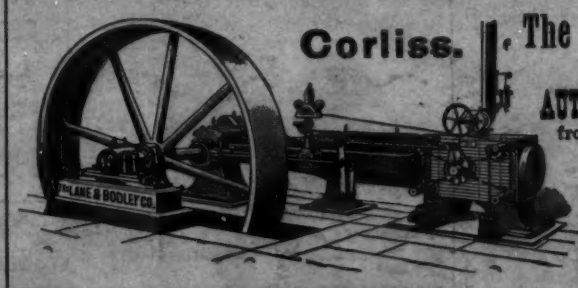

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